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ORIGINAL COMMUNICATIONS.

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THE SUBMUCOUS RESECTION OF THE SEPTUM, ILLUSTRATED.*

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THE STEPS OR STAGES OF THE SUBMUCOUS RESECTION OF THE SEPTUM.

1. Apply a 1/2000 solution of adrenalin to the entire surface of both sides of the septum on thin pledgets of cotton. These should be left in position for eight or ten minutes.

2. Local anaesthesia by Freer's method:—A small cotton wound probe, slighly moistened in water, is dipped into pulverized cocaine, and applied about ½ minute, by massage, to each side of the septum. An application should be made every seven minutes. From four to eight applications induce complete local anaesthesia. Occasionally a 20% solution of cocaine applied over the septum with thin pledgets of cotton acts better than the above method.

3. Blanching, and local anaesthesia being induced, the *incision of the mucoperichondrium upon one side only* by Hajek's or Killian's method is performed.

4. The mucoperichondrium (and periosteum) is next elevated upon the side of the incision.

5. The incision is next carried through the cartilage, but not through the opposite mucoperichondrium. To carry the incision through both membranes results in a permanent perforation, unless one side is closed by suture.

* Read before the Tenth Annual Meeting of the American Academy of Ophthalmology and Oto-Laryngology, held at Buffalo, September 14, 15 and 16, 1905.

6. Elevate the mucoperichondrium on the opposite side, by introducing the elevators through the incision in the cartilage.

7. Remove such portion of the cartilaginous septum as may be necessary, with the "swivel knife."

8. Remove the deflected portion of the perpendicular plate of the ethmoid bone with the submucous saws, or with the Foster-Ballenger bitting forceps.

9. Remove the bony ridge near the floor of the nose, by fracture, or with the gouge and mallet.

10. Insert a gauze dressing, or Simpson's sponge tents, into each nostril, to coapt the mucoperichondria. These serve the double purpose of preventing profuse hemorrhage, and the formation of a haemotoma between the mucoperichondria.

11. Remove the dressings in twenty-four to forty-eight hours. A second dressing is unnecessary, unless there has been loss of mucous membrane. In this event it may be necessary to introduce dressings daily, until the denuded area is healed by granulation.

ACCIDENTS AND SEQUELAE.

1. Laceration of the mucosa in removing the cartilage.

2. Tearing the mucosa in elevation.

3. Tearing the mucosa in removing the perpendicular plate of the ethmoid.

4. Tearing the mucosa in removing the bony ridge.

5. Exciting an acute sinuitis upon a pre-existing chronic sinuitis.

6. Surgical fever.

7. Sepsis from retained secretions.

8. Perforation from opposite incisions or lacerations through the opposing mucoperichondria.

9. Sinking in of the bridge of the nose.

THE AUTHOR'S CONTENTION AS TO THE FREQUENT INTRODUCTION OF INSTRUMENTS BETWEEN THE MUCOPERICHONDRIA.

The chief element of danger to the successful performance of the submucous resection of the septum narium is the perforation of the septum. While a perforation is not a serious sequellae, it is, nevertheless, desirable to avoid it if possible. My endeavor has been, therefore, to devise a method at once speedy, and relatively safe. To do this it seemed wise to devise or adapt an armamentarium requiring but few introductions of instruments.

For the removal of the cartilage the author's "swivel knife" was invented in February, 1905. In nearly all cases but one introductio of this instrument is necessary.

For the removal of the perpendicular plate of the ethmoid bone the submucous saws are adapted from Kyle's models. Another, and, the author hopes a still better instrument for this purpose, is the Foster-Ballenger bone-cutting forceps referred to under Figure (30).

For the removal of the deformed vomer, or ridge, the author has introduced a forceps for fracturing it from its attachment to the superior maxillae.

It is thus apparent that his aim is to simplify the three major steps of the operation.

Thus far Hajek's elevators seem to be best suited for the separation of the mucoperichondrium from the cartilage.

Additional reasons for adopting a simple armamentarium, requiring few introductions for instruments, are the lessened shock, and the shorter time required for the performance of the operation. These are all-important matters from the patient's point of view. The patient has a right to expect the best results, with the least shock, in the least period of time, and with the greatest safety to his septum. The author hopes the method illustrated in this paper possesses these qualities.

Figure 1.—Showing a high, wide deviation, located in the cartilage and perpendicular plate of the ethmoid bone. Figure 2, shows the anterior view of the same. It is obvious that the "swivel knife" will not embrace so wide a deviation. It is better, therefore, to remove the deflected cartilage in two pieces. That is, elevate the mucoperichondrium above the crest of the deviation, and over the whole area on the concave side, then introduce the swivel knife through the upper limit of the Hajek or Killian incision, pushing it along the ridge of the nose, thence downward and backward, to the crest of the deviation, thence forward along the crest, until it emerges from the anterior incision. This portion of cartilage is then removed with forceps. Having removed the upper portion of the deflected cartilage, it is obvious that the lower portion can be readily bent towards the median line (Fig. 3). This allows of the elevation of the mucoperichondrium on the under side of the crest. To have attempted the elevation in this position, before the removal of the upper portion of the cartilage, would have almost certainly

resulted in laceration of the mucoperichondrium. With the upper edge (crest line) of the cartilage liberated, the elevator readily

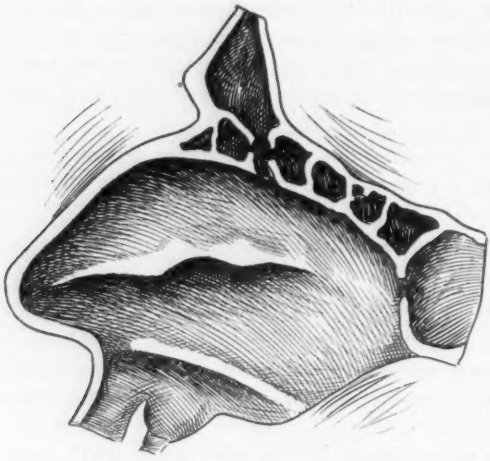


Fig. 1.

crowds the lower portion of the cartilage towards the median line, thus relieving the tension from the mucoperichondrium. After

Fig. 2.

elevating the mucoperichondrium on the under surface of the deviated cartilage, the swivel knife is used to remove it.

Figure 2.—Shows the anterior view of Figure 1.

Figure 3.—These diagrams illustrate the principles involved in elevating the mucoperichondrium on the under surface of a cartilaginous crest. (a) Shows the extent of the primary elevation, the narrow lines being the mucoperichondria, the heavy line the deflected

Fig. 3.

cartilage. (b) Shows the upper portion of the cartilage removed. (c) Shows the Hajek elevator crowding the lower portion of the cartilage towards the median line, thus relieving the tension that would otherwise be exerted upon the mucoperichondrium. The

Fig. 4.

removal of the upper half allows the lower half to be separated from the mucoperichondrium without tearing it.

Figure 4.—This diagrammatic section shows a compound deviation of the septum; a low ridge with a sharp crest, and an upper curved deflection towards the opposite side. This is a very common

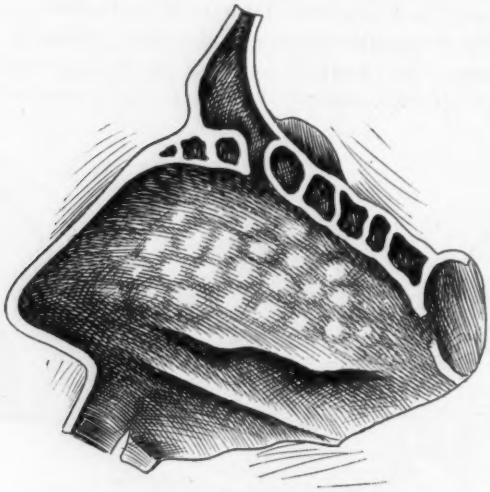


Fig. 5.

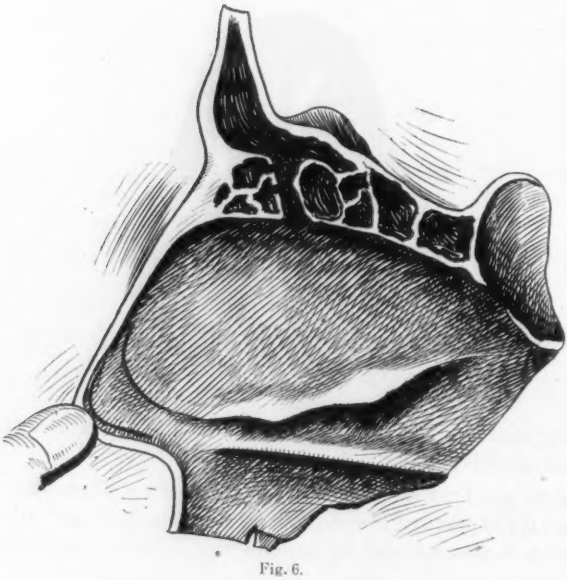


Fig. 6.

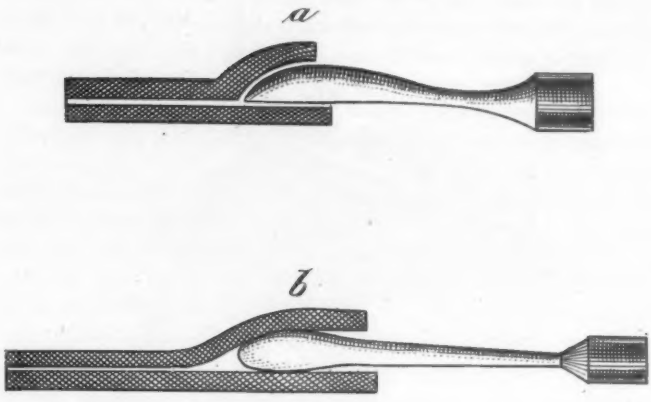


Fig. 7.

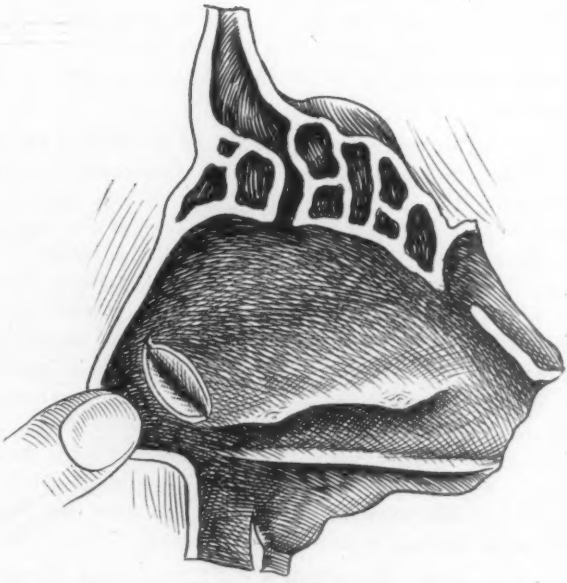


Fig. 8.

type of deviation. The lower ridge obstructs the inferior and middle meatus, while the upper bend obstructs the areation and drainage of the superior meatus, and the accessory sinuses upon that side of the head. The lower deformity presses against the inferior turbinal, while the upper presses against the middle turbinal. It is just as necessary to correct one deviation as the other. This may be done by the sub-mucous resection of the septum. The lower ridge is composed largely of bony tissue, while the upper curved portion is composed in its anterior portion of cartilage, and its posterior portion, of the perpendicular plate of the ethmoid bone. Heretofore, we have been satisfied to remove the lower ridge with a saw, the upper deviation being allowed to remain. Or perhaps the anterior end of the middle turbinal was removed. The submucous resection is peculiarly adapted to this very common type of deviated septa.

Figure 5.—This illustrates a septum with numerous nodular elevations, and a small ridge. The surface of the septum is not smooth, but on the contrary is quite uneven, though in no place is there a marked deviation, except, indeed, the lower ridge. A septum of this type presents a mucoperichondrium very difficult to elevate. It is often quite closely adherent, and the irregular surface renders the elevation still more difficult. In addition, the membrane is often quite thin and friable. It is, in all probability, the seat of an old perichonritis.

Figure 6.—This figure shows the approximate location and extent of the incisions through which the submucous resection of the septum is performed. The one at the extreme tip of the nose is the Hajek, while the one located more posteriorly, at the junction of the vestibular skin and mucous membrane, is the Killian incision. Personally the author usually elects the Killian incision, as the elevation is easier from this point. The cutaneous membrane, more anteriorly, is quite adherent. The author prefers the Hajek incision when the deflection is well forward, as to extend the incision to the anterior end of the ridge, courts laceration of the mucous membrane during the elevation. My rule is therefore, (a) to make the Hajek incision when the ridge extends well forward, and when the septal cartilage at its tip is deflected so as to require removal; (b) to make the Killian incision when the ridge does not extend well forward, and the septal cartilage at its tip is not deflected.

The author nearly always makes the incision upon the patient's left side, as it is easier to do so with his right hand. All other

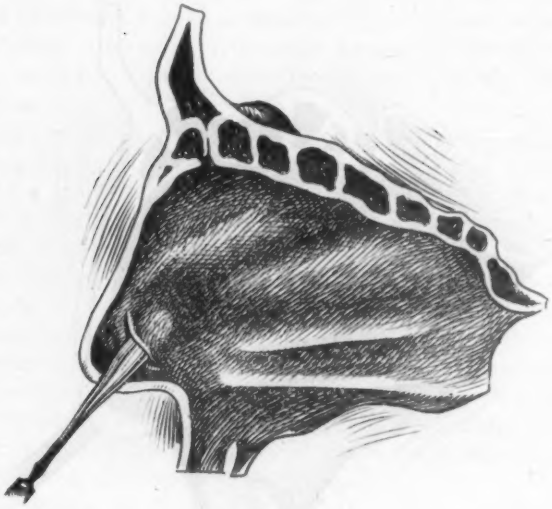


Fig. 9.

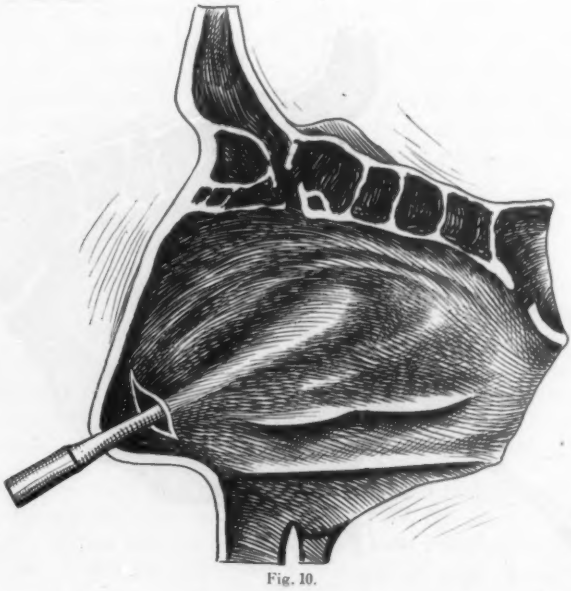


Fig. 10.

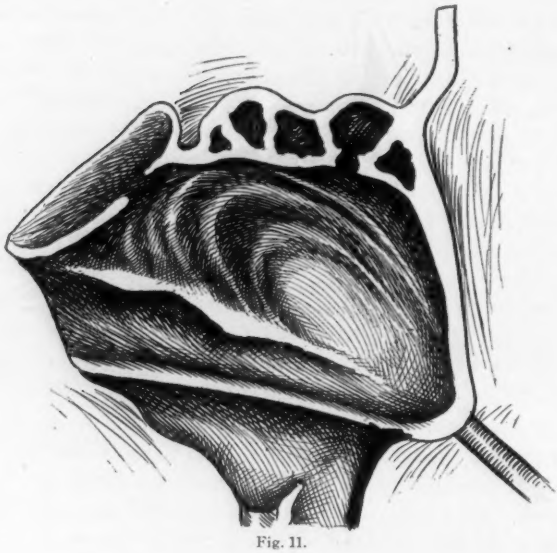


Fig. 11.

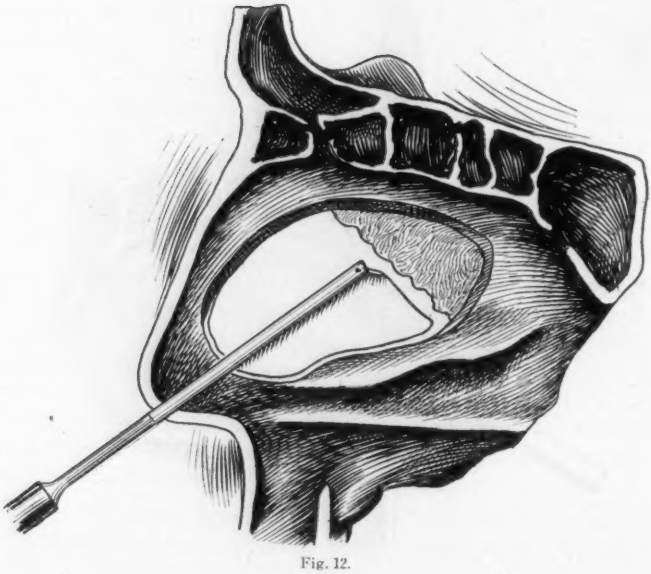


Fig. 12.

writers recommend making it upon the side of greatest convexity, or on the side of the ridge. The author does not find any advantage in this, and in 100 cases has adhered to the above rule, with but two exceptions.

Figure 7.—For the elevation of the mucoperichondrium the author has depended upon the Hajek elevators shown in Figs. 7 and 27. One is flat upon one surface and convex upon the other. The other is convex upon both surfaces. The plano-convex elevator is used to start the elevation of the mucoperichondria, while the biconvex is used to complete it. The principle involved in the elevation is shown in Figure 7: (a) shows the plano-convex elevator starting the elevation, its flat surface being applied to the cartilage; (b) shows the biconvex elevator lifting the membrane ahead of its tip or edge. This constitutes the safety of the instrument. The elevation may be rapidly done with this elevator with little danger of tearing, whereas, if a flat, sharp elevator is used, it is necessary to proceed wtih great caution so as to avoid injury to the mucosa.

After starting the elevation with the sharp elevator (plano-convex), it usually requires less than one minute to complete it with the dull or biconvex elevator.

Figure 8.—Shows the Killian incision on the left side of the septum. The small flap made by the curved incision is elevated and turned back, exposing the cartilage to view. The incision has also been extended into the cartilage, as shown by the dark line. The elevation may be carried still further with the plano-convex elevator, though the bi-convex one should be used from this stage on.

Figure 9.—This shows the sharp or plano-convex elevator at work. It should not be used beyond the depth shown in the illustration, as to do so invites laceration of the mucous membrane.

Figure 10.—Shows the dull or bi-convex elevator rapidly separating the mucoperichondrium from the left side of the septum. The separation is only carried down to the crests of the two elongated spurs. To attempt to elevate below the crest would result in laceration of the mucous membrane in this region. When we come to deal with the removal of the ridge, it will be explained why it is unnecessary to elevate the mucoperichondrium below the crest.

Figure 11.—In this illustration the dull elevator is shown doing its work through an incision in the cartilage on the opposite side from the Killian incision. The wave-like lines indicate the area of elevation. It will be noticed that they stop at the crest of the ridge.

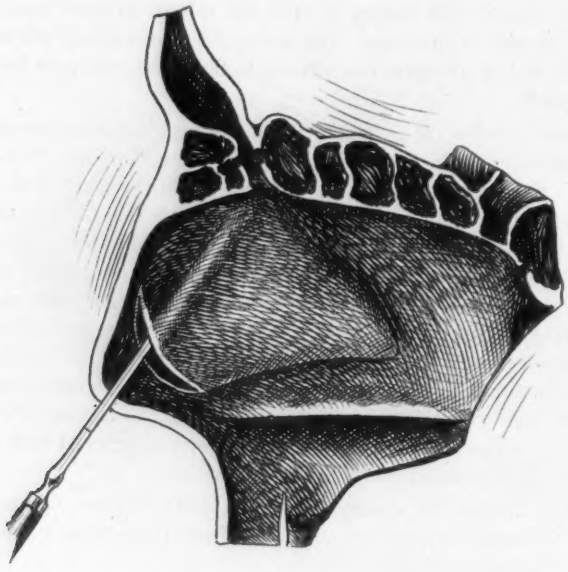


Fig. 13.

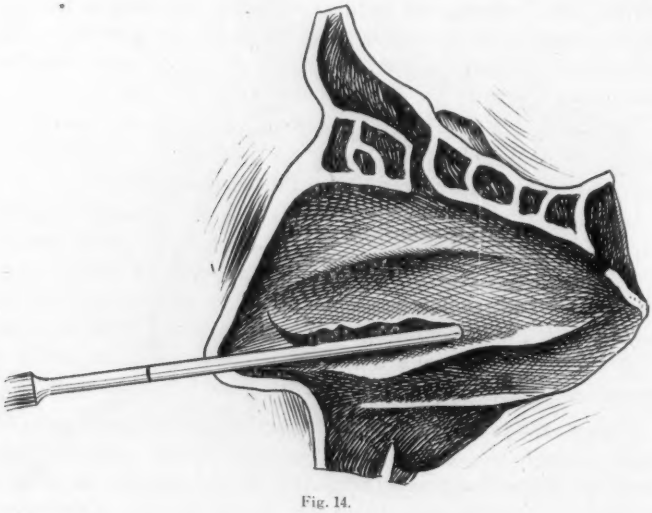


Fig. 14.

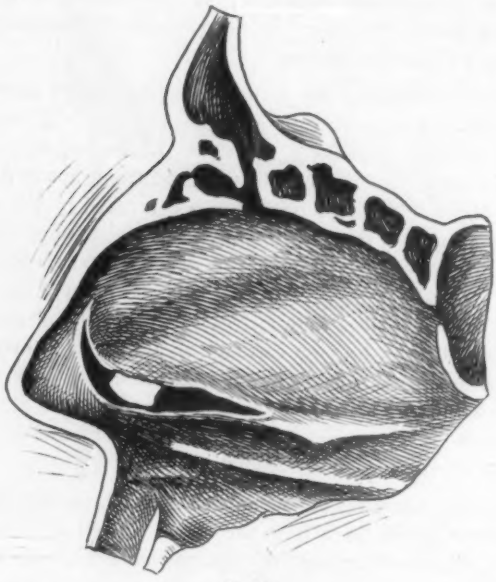


Fig. 15.

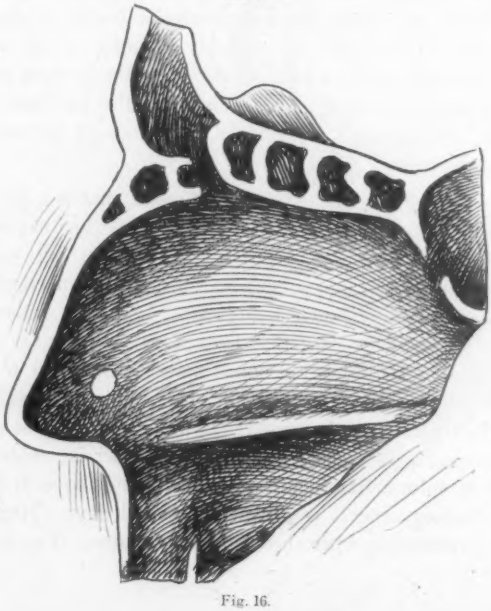


Fig. 16.

Under no circumstance should the operator attempt to elevate the membrane below the crest. It is absolutely unnecessary, and if attempted will tear the mucosa.

Figure 12.—Showing the author's "swivel septum knife" in the act of removing a portion of the septal cartilage. The mucosa is removed to show the swivel knife and its line of incision. The stirrup, or swivel blade, swings between the prong-tips of the handle, and the direction of its cutting edge is controlled by the resistance of the cartilaginous tissue through which it is passing. That is, it follows the prong-tips, no matter in what direction they may be directed. Under no circumstance should the incision of the cartilage be carried farther anteriorly than is shown by the anterior heavy shaded line. Enough cartilage should be left to support the bridge of the nose. The author has one case, in which too much cartilage was removed, and there is moderate sinking in of the bridge of the nose in consequence. This will be corrected by paraffin injections when contraction is complete.

Figure 13.—Showing the same as Figure 12, except the mucous membrane is intact, as it is in the actual operation. The "swivel knife" is introduced between the mucoperichondria with its prongs astride the cartilage. It has cut, thus far, along the upper margin of the vomer, and along the antero-inferior border of the perpendicular plate of the ethmoid. It only remains to pull the swivel knife downward and forward, parallel with the present position of the instrument to complete the excision of the cartilage. Having done this, the cartilage is removed with forceps through the incision, as shown in Figure 17.

Figure 14.—Showing one of the accidents, that is a laceration of the mucoperichondrium with the swivel knife. The exposed prong was not placed beneath the mucoperichodrium, but was astride both the cartilage and the membrane. This accident need not occur if the septum speculum shown in Figure 34 is used. Indeed, it need not occur if ordinary care is exercised in introducing the swivel knife. Such a laceration is not necessarily inimical to the final success of the operation, unless the mucosa on the opposite side is also perforated. If both membranes are perforated, at points exactly opposite, a permanent perforation will persist unless one side is closed by suture. The chief objection to the above, is in the fact that the healing process is prolonged several days. Healing takes place by granulation, instead of by first intention. The author once

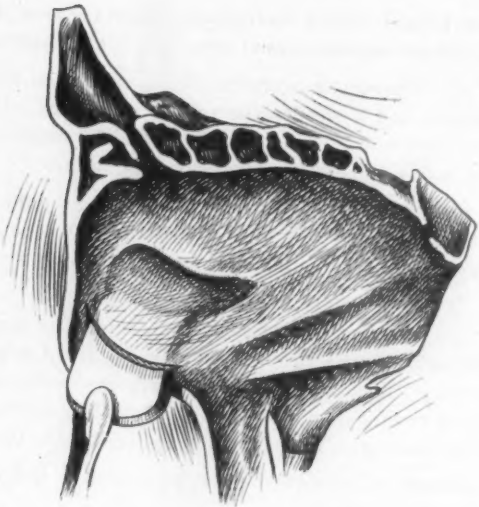


Fig. 17.

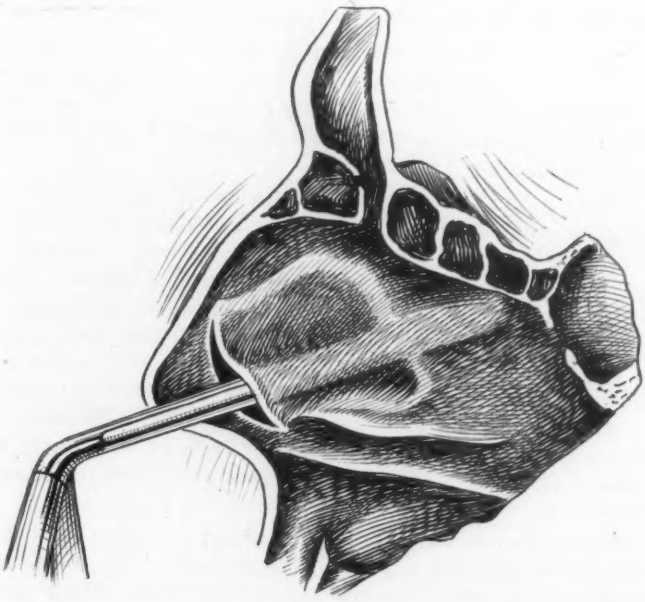


Fig. 18.

removed an area of mucosa corresponding with the area of cartilage removed, with no untoward result other than the delayed healing.

Figure 15.—Showing a laceration of the mucosa on the left side of the septum, and a smaller one on the right (the white area). In this case a permanent perforation the size of the smaller laceration will follow, unless one of the rents is closed by suture.

Figure 16.—Showing a permanent perforation, from the laceration of both perichondria, at points exactly opposite. If one membrane is perforated anteriorly and the other more posteriorly a perforation will not follow.

Figure 17.—Showing the cartilage in the process of removal with forceps through Killian's incision. The time required for the removal of the cartilage, including the excision with the swivel knife, need occupy no more time than one minute. The mucoperichondria are, of course, elevated prior to the excision and removal of the cartilage.

Is it necessary to remove the cartilage when it is not deviated so as to obstruct the nose?

Yes; it should be removed so as to expose the deviated perpendicular plate, and the deformed upper margin of the vomer (ridge).

Figure 18.—Showing the cartilage removed, and the deviated portion of the perpendicular plate of the ethmoid being removed submucously with the Foster-Ballenger forceps (Figure 30). The bony plate is being bitten away piece by piece until the upper bend, shown in Figure 4, is removed.

Figure 19.—Showing the author's method of removing the perpendicular plate of the ethmoid. Kyle's saws have been modified by the author so as to adapt them to submucous work. The plate is sawn through with the straight saw, in two lines parallel to each other, and then they are connected at their posterior extremities, by a cross line with the right-angle saw. The rectangular piece of bone is then removed *en masse* with dressing forceps. This method preserves the specimen for inspection. The author has used this method in a few cases with great satisfaction. In this illustration the mucoperichondrium is removed to show the method of using the saws. In the actual operation the saws are introduced between the mucoperichondria.

Figure 20.—Showing the V-shaped gouge in position. The final step in the operation consists in the removal of the lower bony ridge. This is usually done with a gouge and mallet. The gouge is

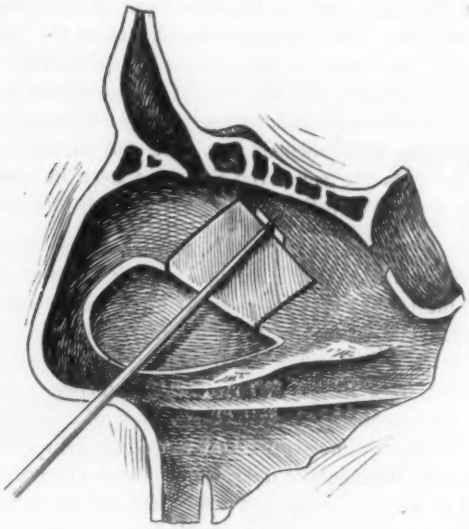


Fig. 19.

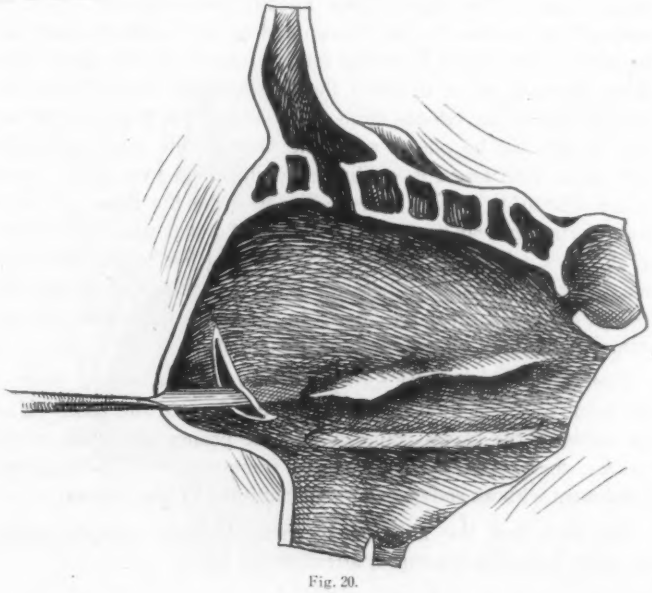


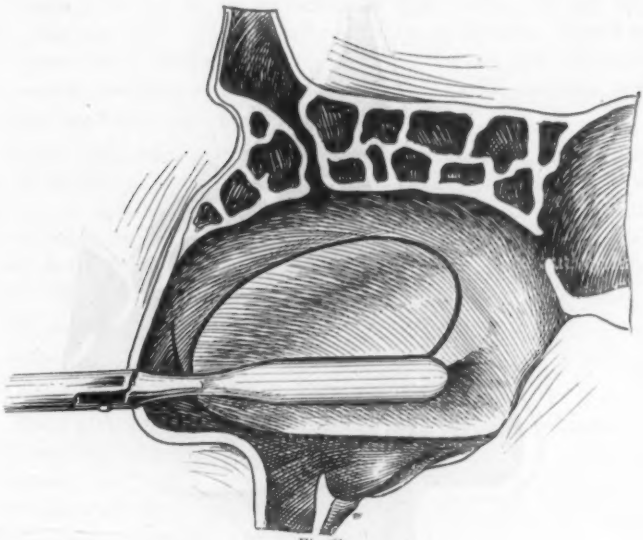
Fig. 20.

driven into the ridge, until it splinters from its attachment to the superior maxillae. The mucoperiosteum, below the crest of the ridge, becomes separated in the process of splintering, hence the wisdom of discontinuing the elevation of the membrane at the crest. This step of the operation is not always easily accomplished without perforating the mucous membrane. Care and patience are essential requisites. Having splintered the ridge from its attachment it may be removed through the Killian incision with forceps.

Figure 21.—Showing the author's method of removing the bony ridge. Forceps similar to the Adams or Asch (Figure 40) is used to fracture the ridge (Vomer) from its attachment to the superior maxillae. A blade is introduced into either nostril *outside of the mucous membrane,* the ridge seized, and with a twisting motion, it is fractured from its attachment to the superior maxillae. In fracturing, the mucoperiosteum below the crest of the ridge becomes separated. Dressing forceps are now introduced through Killian's incision, and the fragments of the ridge removed. The time required is shorter than with the gouge and mallet, and it is much easier done. The procedure is painless, and is attended by little or no shock. It should be remarked that the cartilage, and a portion of the perpendicular plate of the ethmoid have already been removed, hence the force of the fracture is not transmitted to the cribiform-plate and the brain. The author is having forceps made with the edges of the blades beveled, so as to avoid the possibility of their cutting the mucosa as they are twisted from side to side. The blade of the forceps should not be placed upon the floor of the nose, but about 3/16 of an inch above it, so that in rolling them from side to side, in the fracturing process, they will not strike the floor, and with this fulcrumage tear the mucosa. The author has used this method seven times, with good and speedy success in five of the cases. In one, the mucosa was torn near the floor, on account of placing the forceps blades too near the floor. In the other, the vomer was not ossified on account of the youth of the patient.

Place the blades of the forceps high enough to permit them to roll from side to side without striking the floor of the nose. With the edges of the blades rounded, and the proper placement of the forceps, the vomer (ridge) may be fractured from its maxillary attachment without endangering the continuity of the mucosa.

The dark oval line indicates the area of tissue removed above the crest, before its fracture is attempted.



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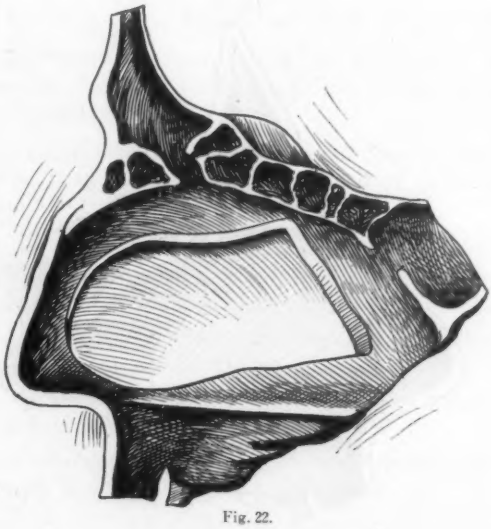


Fig. 22.

Fig. 23.

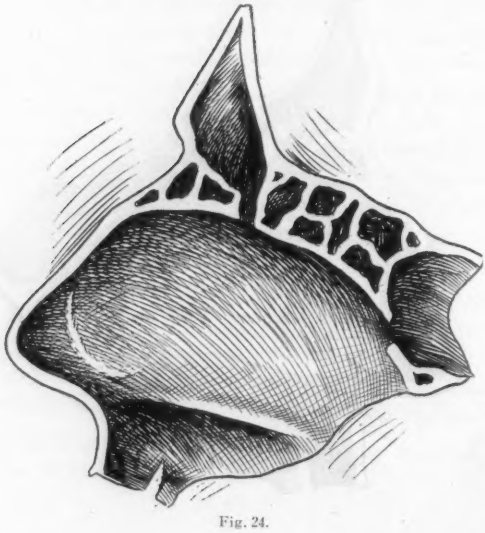


Fig. 24.

Figure 22.—Showing the amount of tissue removed when the cartilage, a portion of the perpendicular plate of the ethmoid, and the ridge are removed. It is not necessary, in all cases, to remove this much of the framework of the septum. In one case, however, the author removed the entire framework except the cartilage supporting the bridge and tip of the nose.

Figure 23.—Showing the postoperative encrustation at the site of the Killian incision. They are usually easily removed, though in two of the author's cases, they were of glue-like consistency, and adhered accordingly. The patient should be instructed to introduce vaseline into the vestibule of the nose twice daily, to prevent encrustation. The crusts persist for from one week to four weeks.

Figure 24.—Showing a septum corrected by the submucous resection of the deviated portion of its framework. The white line anteriorly is the location of the scar of the Killian incision.

The septum may be made absolutely plane and perpendicular by this method of operating, hence the superiority of the submucous operation over other methods. It is not claimed by the author that other methods of operating should not be done. On the contrary there are cases in which they should be done.

AXIOMS.

1. Never do a long operation, when a short one will do as well.

2. *Make haste slowly* in starting the elevation of the mucoperichondrium. Any other manner of haste is liable to result in a permanent perforation.

3. Do not extend the Killian incision through both mucous membranes, as to do so, is tempting providence in the form of a perforation.

4. A few instruments infrequently introduced, between the membranes should be the aim.

5. Don't "fish" between the perichondria for what you want, but look, see, feel, then remove what you want. "Fishing" in the cavity is liable to tear the mucosa.

6. A sharp-pointed instrument in a cavity is a dangerous thing. A dull one is safer.

7. The mucoperichondrium is easily and quickly lifted with a blunt elevator in 95 per cent of all cases.

8. A sharp elevator is a dangerous instrument, except in the hands of an experienced and careful operator. It is an instrument foremergencies, and not for general use, at least in the hands of the average operator.

9. The external ridge of the nose needs support, hence leave plenty of cartilage in this region for this purpose.

10. Never make a move until you know what you are doing. Then do it.

11. Do not operate to straighten the septum, rather to remove obstructive lesions.

12. Operate vith a view to the patient's comfort and permanent relief. This is what he employs you for.

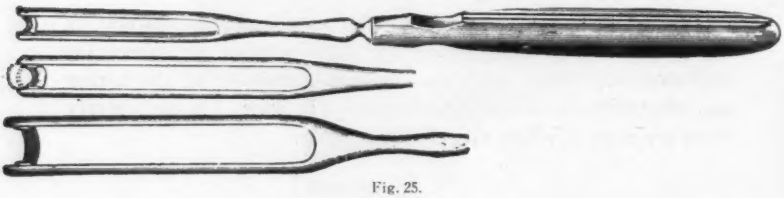


Fig. 25.

Figure 25.—The author's "swivel knife" is made in two parts; the handle and the prongs, and the swivel knife. It is only used to remove the cartilaginous portion of the septum, which it does in one piece in a few seconds. The above illustrations show the two widths of the swivel knife. The wider one is for extreme deviations of the septal cartilage, and for the removal of part, or all of the middle and inferior turbinated bodies, though others may be used.

The swivel blade is swung on pivots between the prong tips, between which it freely swings in a complete circle. The direction of the cutting edge (concave edge) is controlled by the resistance of the cartilage, or other tissue through which it is passing. In the submucous operation the cartilage is removed *en masse* within a few seconds of time, one minute rarely being required for this purpose. The operation is thus shortened, the number of instrumentations considerably diminished, and the specimen is preserved for inspection. The "swivel knife" renders the submucous resection of the nasal septum, especially the cartilaginous portion, simple and at-

tractive. The use of the instrument is so easily mastered that a novice should feel at home with it after the first trial.

Figure 26.—The author's mucosa knife with which the preliminary incision through the mucoperichondrium and cartilage is made.

Fig. 26.

The blade is short to obviate the liability of cutting the alae of the nose.

Figure 27.—The author's modification of Hajek's muco-perichondrial elevators, on one handle, one tip on either end. One is semi-sharp, the other blunt. The sharp tip is used to start the elevation, the blunt one to complete it. In nearly every case more time is consumed in starting the elevation, than in completing it

Fig. 27.

with the blunt instrument. Ordinarily the separation can be completed with the blunt instrument in less than one minute, whereas, to start it with the sharp elevator may require five or more minutes. In very exceptional cases a sharp elevator may be required to complete the elevation.

Fig. 28.

Figure 28.—The author's gouge for the submucous removal of septal ridges. The gouge is an arc of a circle and the cutting-edge is V-shaped, thus enabling it to engage readily in the septal ridge.

Figure 29.—Kyle's septum saws. The author has modified them so as to adapt them to the submucous resection of the perpendicular plate of the ethmoid, as shown in Figure 19.

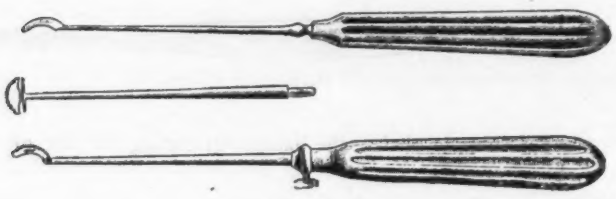


Fig. 29.

Figure 30.—The Foster-Ballenger septum bone forceps, for the removal of the perpendicular plate of the ethmoid. Two bites with one introduction of the instrument removes all that is necessary in the average case. This instrument is designed for the purpose of

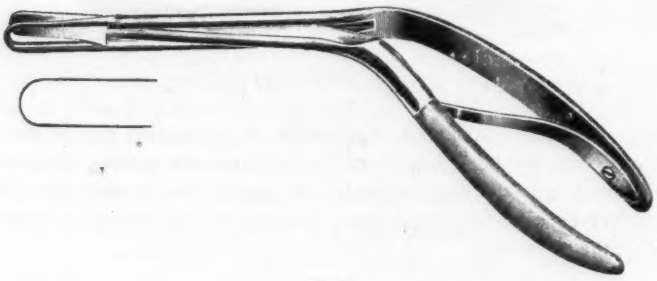


Fig. 30.

diminishing the number of times the instrument need be introduced between the mucoperichondria. With each additional introduction of an instrument there is added liability to lacerate the membrane. Endeavor, therefore, to remove as much tissue as possible with each instrumentation.

Fig. 31.

Figure 31.—Heffernan's nasal sepculum, the best the author has used for intra-nasal operations. They come in pairs.

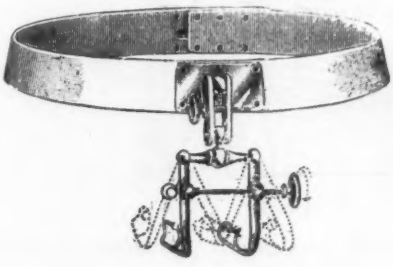


Fig. 32.

Fig. 33.

Figure 32.—Beck's nasal speculum, with a head-band attachment.

Figure 33.—Beck's septum speculum. Also used to clamp the mucoperichondria while packing the nasal chambers.

Figure 34.—Foster's septum speculum. This is a useful instrument in introducing the narrow swivel knife between the mucoperichondria and astride the cartilage. The blades of the speculum are introduced submucously through the Killian or Hajek incision, one on either side of the septal cartilage. The swivel knife is introduced between the septal blades, and astride the cartilage. When

Fig. 34.

it has penetrated the cartilage along the floor of the nose sufficiently to be well within the membraneous pouch, the speculum should be removed, and the cartilaginous septum encircled with the swivel blade, thus completely severing the desired portion of the cartilage from its attachments. It is then removed through the anterior incision with dressing forceps as shown in Figure 17.

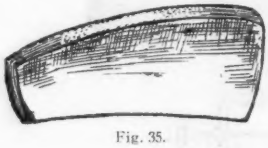


Fig. 35.

Figure 35.—Simpson's sponge tents used by the author to pack the nose after the submucous resection of the septum.

Figures 36, 38 and 39 show other models of the author's swivel knife. Figure 36 was the first model invented by the author. It has a single prong. Figure 37 shows a universal cutting-knife, a steel wire stretched between the prongs forming the blade. It cuts with considerable resistance, and is not recommended. The author has also designed a cautery knife similar in appearance to Figure 37,

but the swivel knife is so much simpler and more satisfactory, that it is recommended to the exclusion of all other models of universal cutting septum knives.

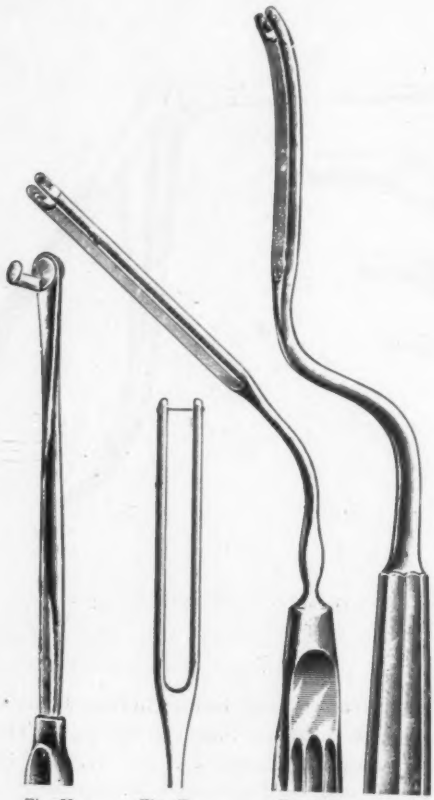


Fig. 36. Fig. 37. Fig. 38. Fig. 39.

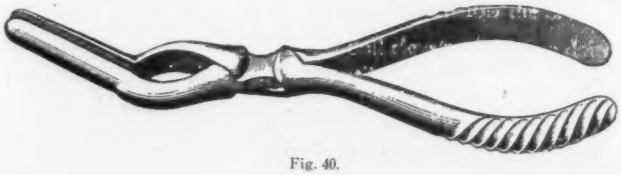


Fig. 40.

Figure 40.—Septum forceps used to fracture the bony ridge (vomer) from its attachment to the superior maxillae in the submucous operation. The inner edges of the blades should be beveled (see Figure 21).

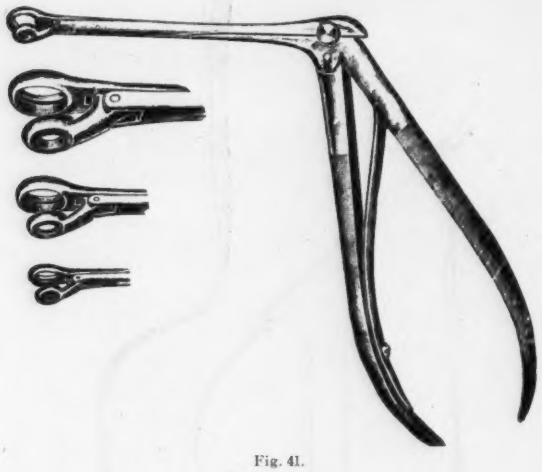


Fig. 41.

Figure 41.—The Grunwald-Freer bone forceps.

INSTRUMENTS USED IN THE SUBMUCOUS RESECTION.

The following instruments may be used in the submucous resection of the septum, though but few of them are necessary. The ones used by the author are shown in Figures 25, 26, 27, 29, 30, 31 and 34. Some of these may be dispensed with, namely 26, 28, 31 and 34, as every rhinologist has similar instruments in his outfit which can be utilized in their stead. This leaves a net outfit of instruments which are essential in the performance of the operation:

(1) 1 Swivel knife, Figure 25.
(2) Double Elevator, one handle, Figure 27.
(3) 1 Gouge, Figure 28.
(4) 1 Bone forceps, Figure 30.
(5) 1 Septum speculum, Figure 32.

While the Heffernan wire nasal speculum is the best operative speculum the author has used, almost any light nasal speculum can be used with satisfaction. The author's mucosa knife is a convenient addition to the outfit, but is not indispensable, as any narrow bladed scalpel will answer the purpose. Every office is probably supplied with a forceps similar to the Adams or the Asch, hence it is not necessary to include this instrument in the outfit. The author has simply had the edges of the Asch septum forceps beveled to adapt it to the submucous operation.

These remarks are made to show the limited number of special instruments (five in all) actually required for the successful performance of this operation.

As to the Simpson splints, the author finds them admirable for the purpose, easily and quickly introduced and removed with slight danger to the operative field. They may be removed layer by layer, until only one thin plica remains as a film over the septal mucous membrane. If necessary this may be left in position for another day to protect the operative field.

CONCLUSION.

The author offers the foregoing pictorial presentation of the submucous resection of the nasal septum as a speedy, safe, simple and successful method of performing the operation.

He has used it in more than one hundred cases with good satisfaction to himself and patients. It is not claimed that all cases are successfully operated by this method. Some are more successfully operated by other methods, or by other operations. The limited experience of the author does not warrant him in forecasting the field in which this method is applicable. It appears however, to be well adapted to fully 90 per cent of all septal deformities requiring surgical correction.

This paper will not enter into a discussion of the difficulties to be encountered, and the complications and sequellae which occasionally arise. These matters will be reserved for a future communication. The instruments are made by Mr. L. R. Kratzmueller, 45 Wabash Avenue, Chicago.

103 State St.

THE TECHNIC OF THE SUBMUCOUS RESECTION OF THE SEPTUM.*

BY SIDNEY YANKAUER, M.D., NEW YORK CITY.

In order to consider the re-section of the cartilaginous and bony septum from every point of view, it may be advisable to recapitulate the structure of the cartilage and bones and their relations to each other in the various forms of deviation.

The attachments of the septum to the base of the skull and to the floor of the nose, as well as to the posterior border of the vomer, are practically always in the median sagittal plane. The deviations are, therefore, most pronounced in the anterior, inferior and mobile parts of the septum, and generally occupy only a small portion of its entire area.

In every deviated septum, we can distinguish a point which is farthest removed from the median sagittal plane, and this we may call the *apex* of the deviation. From the apex the septum may be said to slope towards the median plane in every direction, and we may distinguish an anterior, a superior, a posterior and an inferior *slope*. The deviation itself has the shape of a pyramid, whose base lies in the median plane. In mild cases, the shape is that of a right pyramid; the apex lies high up in the nose, and the slopes of the deviation slant with an equal inclination in all directions from the apex. These deviations lie entirely in the cartilage. As the deviation becomes more marked, the apex is displaced downwards and forwards. The shape of the deviation resembles an oblique pyramid pointing towards the vestibule of the nose, the anterior, and more especially the inferior, slopes becoming more abrupt.

The anterior slope is composed entirely of cartilage; the superior slope, of cartilage in front and the vertical plate of the ethmoid behind; the posterior slope is made up entirely of the vomer; and the inferior slope of the posterior part of the nasal spine. The anterior nasal spine extends further backward than is generally supposed. It corresponds to the inter-maxillary bone, and may be 2 or 3 cm. long. In the diagram of the septum in Killian's original article, the vomer is shown extending anteriorly to the front of the nostril, with its tip ending in a sharp point. This tip he calls the "anterior vomer

* Read before the Section on Laryngology and Rhinology of the New York Academy of Medicine, March 28, 1906.

triangle." This is not in accord with observations made by the writer on a large number of skulls in the anatomical laboratory of The College of Physicians and Surgeons. The tip of the vomer is blunt and irregular, and fits into an angle between the posterior edge of the nasal spine and the maxillary ridge.

The anterior slope not infrequently crosses the median plane and appears in the other nostril as so-called dislocated cartilage; but in many of these cases, the anterior part of the nasal spine is also

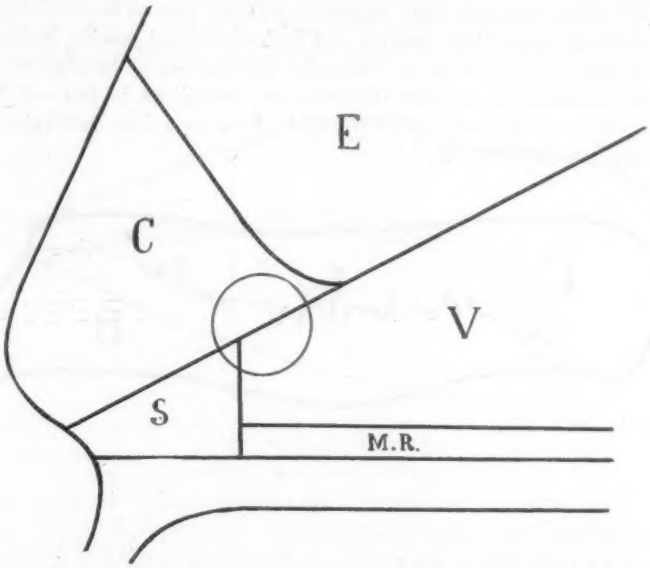


Fig. 1. Diagram of Septum. C, Cartilage. E, Vertical Plate of the Ethmoid. V, Vomer. S, Anterior Nasal Spine. M. R, Maxillary Ridge. The Circle denotes the situation of the Epiphyseal Center.

twisted in a corresponding manner, the suture between the cartilage and bone being intact. The superior slope also occasionally crosses the median plane, and returns thereto in a sweeping curve, high up in the nose. This is the well-known sigmoid deviation. The angle between the anterior and superior slopes is occasionally a very sharp one and appears in the nose as a vertical ridge. These are the cases which Freer calls "deflections with a vertical angle." Killian calls them traumatic cases, for this ridge is especialy sharp in cases in

which the cartilage has been fractured, and in which the fragments may be disposed at various angles between the mucous membranes, separated from each other by cicatricial tissue. Most frequently, however, the anterior slope is continued into the superior slope by a gradual rounded curve, so that the cartilage, when removed, does not present a pronounced bend. In like manner the posterior slope, the vomer, is continued into the inferior slope, the spine, by a similar gentle curve. But the anterio-superior half and the posterior-inferior half of the deviation meet at a sharp angle, which is prominently visible in the nose as a ridge, beginning near the floor of the nose at the vestibule, extending upwards and backwards, and passing through the apex of the deviation. This ridge corresponds to the edge of the cartilage, which overlaps the bone, and sometimes, in front of the apex, projects downward beyond the bone as a free cartilaginous plate or enchondrosis.

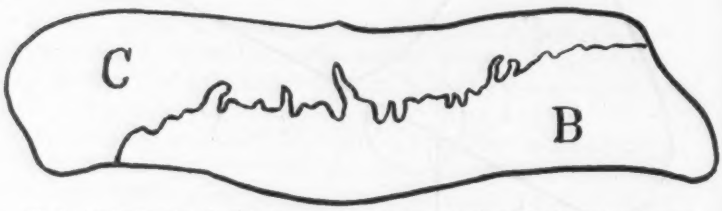


Fig. 2. Sagittal section through the crest showing the irregularities of the surface between the cartilage C and the bone B.

The surface of bone beneath the cartilage, which is here distinguished as the crest of the deviation, consists of the upper edge of the spine and of the vomer, the two bones meeting at an angle which corresponds to the apex of the deviation. The crest presents a continuous rough surface, several mm. wide and grooved along its entire length. The edges of this groove, both on the concave and on the convex side of the septum, are prolonged upwards in the form of irregular bony projections or serrations. Some of these serrations lie flat against the cartilage, others are entirely covered with periosteum; some are small and pointed, others spread out in the periosteum in a fan-shaped manner. In the neighborhood of the apex, they occasionally have the form of large pointed spurs or thick blunt exostoses. These serrations are of great importance to the operator, as their presence accounts in part for the firm attachment of the periosteum to the edge of the crest.

Th attachment of the cartilage to the edge of the vertical plate of the ethmoid, is sometimes a transverse osteochondrosis, but more often the suture line is oblique, the bone descending along the side of the cartilage, usually on the side of the concavity. At times the bone is split into two plates enclosing the cartilage between them. The attachment of the cartilage to the bony crest is also an osteochondrosis behind the apex; but in front of the apex, it is separated from the bone by a layer of dense fibrous tissue described by Killian as periosteum. This layer of tissue passes across the septum, uniting the perichondrium of one side to that of the other, and supporting the cartilage as in a sling. It is thick in front near the mobile part of the septum, but becomes thinner posteriorly, and disappears in the

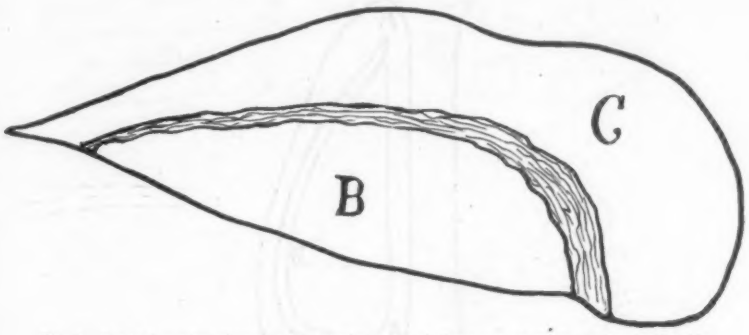


Fig. 3. Sagittal section through the anterior part of the crest, showing the layer of dense fibrous tissue between the cartilage and bone.

neighborhood of the apex. It is often thicker and stronger than the mucous membrane. It is less firmly attached to the cartilage than to the rough surface of the crest and to the serrations on its edge.

The mucous membrane of the septum is often thick on the convex side, and when it lies close to the cartilage on the hollow side is frequently quite thin in the deepest part of the hollow, opposite the apex. But it is very apt to pass smoothly over the hollow and irregular parts of the bone and cartilage, and its thickenings and hypertrophies alter the external shape of the septum as seen through the nostril. Practical experience as well as anatomical study, however, has shown that the description of the cartilage and bones given above, is true of the large majority of deviations, *the differences between the various forms being due to variations in the*

inclination of the four slopes of the deviation, and in the sharpness of the angles between these slopes.

The fact that the majority of deviations have this particular structure, may be explained upon certain morphological considerations. If the complete septum is viewed from the side, it can be seen that the sutures betwen the cartilage and bones, and between the different bones, radiate from a certain point which corresponds to the apex in the *deviated* septum. In early life bone formation takes place along all these lines, and they may be considered analogous to the epiphyseal line of growing bones, as in fact they are. The point from which they radiate may be considered the epiphyseal center

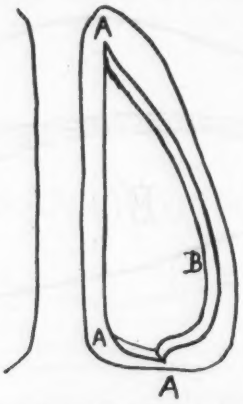


Fig. 4. Diagram illustrating how the author's incision AAA allows the mucous membrane ABA to be reflected upon the outer wall of the nose.

of the septum. Now, the two sides of the body are never alike; and the two nostrils, even at birth, are never of equal size. In the narrower nostril the respiratory air curent is more rapid, the variations in the respiratory air pressure are greater, and hence the circulation is more active than in the other. If irritation of the mucous membrane occurs from the presence of adenoids or from attacks of rhinitis, etc., this irritation will be more pronounced on the narrow side; and as epiphyseal lines are very sensitive to irritation responding thereto by an over-production of bone, any such untoward effect will become focused, as it were, upon this central point. Ossification is completed earliest in the outlying parts of the suture-

lines; bone formation continues longest near the epiphyseal center; hence the epiphyseal center becomes the apex of the deviation. Moreover, the main respiratory channel proceeds upwards and back-

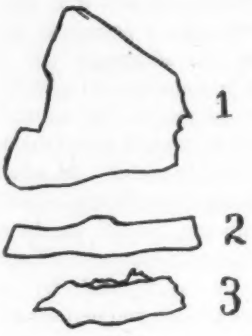


Fig. 5.

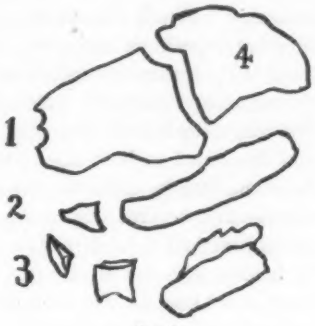


Fig. 6.

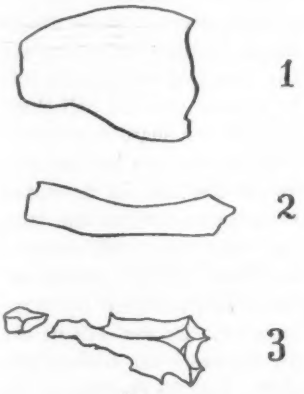


Fig. 7.

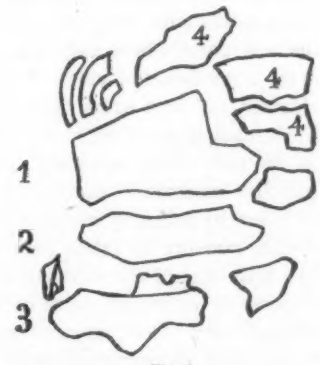


Fig. 8.

Figs. 5, 6, 7 and 8. Pieces of cartilage and bone removed by the author from extreme cases of deviation. Actual size.

1. Piece of cartilage removed with the Ballenger swivel-knife. 2. Strip of cartilage which lay on the crest. 3. The bony crest with deviated parts of the vomer. 4. Pieces from the vertical plate of the ethmoid.

wards from the nostril; and so we find that the suture line which lies nearest to this channel, coresponding to it in direction, is the most frequent seat of the formations of serrations and exostoses.

THE INSTRUMENTS.

For the preliminary cleansing and anaesthesia, each operator will prefer his favorite speculum. For the operation itself, the small device made of piano wire, known as the De Vilbiss speculum, is the most useful. It opens the nostril from above downwards rather than from side to side; it occupies the least room and it is self-retaining. When the operation is performed on a patient in the horizontal position, retractors may be used to advantage, but in most of the manipulations, the shank of the instruments will hold the wound open sufficiently well for practical purposes. For the first incision, a small knife, placed at an angle of 45 degrees to the shank and sharpened on both sides, has been found useful. A small tenotome may be employed for other purposes. As the knives will occasionally become dull from contact with the bone, it has been found practical to have ready a slip of Arkansas oil-stone, sterilized by boiling with the other instruments, which may be used, dry, to sharpen the knives. Elevators for the perichondrium and periosteum are either sharp, half-sharp or blunt. The sharp elevator, which should be fine and sharp like that in Freer's set, is used for beginning the separation and for adhesions. The blunt elevator, which should be broader, with smoothly rounded edges, is used for separating the soft parts where such separation is easy. When an adherent point is reached, the adhesion should be isolated with the half-sharp elevator and then scraped or cut away with the sharp instrument. Such manipulations are very delicate and require care and patience on the part of the operator. The surgeon who has not developed sufficient mechanical dexterity to free the mucous membrane from its adherent points by means of these fine instruments, will secure a certain measure of safety in using very thick, rounded separators. The hook-shaped elevator devised by the writer has been found indispensable in certain parts of the operation. Its use will be described later. Bent, angular and other elevators are occasionally useful when the parts are much distorted. For the removal of the cartilage the ingenious swivel knife of Ballenger has performed excellent service, but it does not remove the entire cartilage. Like the original cartilage knife of Killian it leaves in situ a strip of cartilage which lies upon the crest. It cannot be employed when the cartilage is broken or sharply bent. A pair of forceps with hollow blades which meet edge to edge, the end of which may be bent downwards or upwards, are sufficiently powerful to cut the cartilage easily. The same forceps may be used for the bone by twisting or breaking

it. The amount of bone so removed cannot be exactly controlled, and it may be necessary to use the more powerful fenestrated forceps. A special edge-to-edge forceps has recently been devised by the writer, for the removal of the crest. The Holmes middle turbinated scissors has been found sufficiently powerful to cut through this part of the bone. The shape of the handle of the cutting forceps, and its position in relation to the blades, will vary according to the position of the patient and according to the fancy of the operator. A chisel and mallet may also be used on the crest; as the chisel has a tendency to slip from the bone and injure the mucous membrane, it may be provided with lateral guides as suggested by Dr. Myles.

It may be worth while to remark, that though pain may be obviated by the proper use of cocaine, yet the patients are conscious, and the sensations imparted by the use of the different instruments have been compared to the discomforts experienced in the dentist's chair. The use of the chisel, of course, is the most offensive in this respect. The fenestrated forceps, which close with a sudden snap, are also disagreeable to sensitive patients. The edge-to-edge forceps cause much less shock, but in using them to break or twist the bone, actual pain is sometimes produced. One of the advantages of the Ballenger knife is that its use is accompanied by the least unpleasantness.

THE OPERATION.

The operation is best performed with the patient in the sitting position. There is less bleeding, the management of the illumination is easier, and it is more comfortable for the operator. When, however, cardiac or other disease renders the use of the necessary amount of cocaine dangerous, or if the patient be excessively sensitive or nervous, the horizontal position may be used. The use of a sufficient number of sterilized cotton-tipped toothpicks partly overcomes the annoyance from the more severe bleeding, but the operation will be frequently interrupted by the necessity of expectorating the blood which flows into the pharynx. If there is sufficient assistance, the proper use of retractors makes it somewhat easier to manage the bony parts of the deviation.

Both nostrils are thoroughly cleansed with a spray of saline solution, especially if there is an abundant discharge. The skin of the nose and upper lip is disinfected. If there is a mustache, it is held back by a bandage.

The operation should always be performed through the nostril on the side of the convexity; for here lies the entire field of operation. When the deviation is of the sigmoid variety, the side towards which the bony crest deviates is to be considered the convex side.

Anaesthesia and ischaemia of the septum may be produced by spraying solutions of cocaine and adrenalin, separately or mixed, upon the septum, or by applying them with an applicator. The following method has proved most satisfactory: a thin pledget of cotton, about the size of a half dollar, is spread upon the palm of the hand, and a few drops of a 10% soluton of cocaine are poured upon it. The pledget should not be saturated; any excess is wiped off with a folded towel. The pledget is lifted on the end of an applicator and spread upon the septum. Both sides of the septum are covered with such pledgets which are to remain for five minutes. A 1 to 2000 solution of adrenalin made by diluting the original with 0.6% salt solution, is applied in a similar manner, and left in situ for five minutes. If the nose be rather firmly packed with the adrenalin pledgets, instead of spreading them in a thin layer over the septum, the pressure will aid the adrenalin in driving the blood out of the septum. It is also advisable to make a subperiosteal injection of a weak mixture of these solutions in the vestibule, close to the spine on both sides. This injection not only helps to anaesthetize the anterior parts of the septum, but also seems to make the edge of the nostril insensible, so that the use of a self-retaining speculum ceases to be disagreeable to the patient.

The character of the operation depends to a great extent upon the manner of making the incision in the mucous membrane. Krieg makes a U-shaped flap by means of three incisions, one parallel to the dorsum of the nose, one parallel to the floor, and a third joining these two in front. When the deviation is extreme, the lower incision cannot be made along the floor, but follows the oblique ridge upwards and backwards. Some operators omit the upper limb of this incision, so that the flap becomes L-shaped or V-shaped. A vertical incision may be made far back in the nose, converting the V or L into a U. In these methods, the free tip of the flap lies well forward and the flap is reflected upwards or backwards. Freer makes a vertical incision along the bend in the cartilage which marks the transition from the anterior to the superior slope of the deviation. The incision goes down to the apex, and then follows the oblique ridge downwards and forwards to the vestibule. The flap is V-shaped, with a very wide angle, and is reflected forwards. Sometimes he makes another incision from the apex backwards.

These horizontal incisions are open to the objection that the resulting scars interfere with the main function of the septum, which is to facilitate drainage of the nose. This is accomplished by the capillary attraction between the secretions and the ciliated epithelial surface and by the action of the cilia. When a horizontal band of squamous epithelium is formed, the flow of mucous is impeded, and it dries and forms crusts. In addition, the free flap is disadvantageous because it is unmanageable, and may be caught in the forceps and injured. Also, such a flap retracts, leaving an area which is closed by the opposite mucous membrane only, and which must heal by granulation. As this area is usually situated near the apex, and as the opposite mucous membrane is most likely to be injured at this point, the flap operations have resulted in the largest number of perforations.

Hajek makes a single curved incision in the mobile septum, along the anterior edge of the cartilage, and begins the removal of the cartilage from this point. He leaves the dorsum of the nose supported by a strip of cartilage whose only attachment, the notch between the nasal bones, is very weak; the columna is entirely unsupported, and may be drawn up into the nose by the contraction of the membranous septum, with a very noticeable deformity.

Killian makes a curved incision in front of the deviation, with the convexity forwards. This incision suffices for mild cases in which cartilage only is to be removed. The muco-perichondrium may be stretched open enough to permit the introduction of the Ballenger swivel knife. But in the more severe deviations, where the apex points downward toward the vestibule, where the inferior slope is very horizontal, the management of this lowest part of the septum is according to Killian himself, "most difficult."

These various difficulties and disadvantages may be overcome by making the incision in the following manner: beginning behind the attachment of the lower lateral cartilage, and about 1 cm. from the dorsum of the nose, the incision is made vertically downwards to the lower border of the nostril, to the point where the mucous membrane of the nasal floor meets the skin of the vestibule. It is then carried outwards along this mucous-cutaneous junction, half-way to the outer nasal wall. This incision permits the mucous membrane of the septum to be reflected upon the outer wall of the nose, that of the inner half of the floor being laid upon the outer half. The opening into the septum is just behind the nostril, and when the tip of the

nose is raised, is nearly parallel to it. It is as large as the nostril itself, without stretching the reflected membrane, and any instrumentation that may be done through the nostril can be done through this opening. It gives much better access to the lower part of the septum, and facilitates the management of the bony parts. The flap is well forward, and is anchored to the floor of the nose, so that it is under better control. There is no retraction, and the wound heals by first intention. As none of the cartilage in front of the incision is removed, a bridge of cartilage is left, attached below to the nasal spine, and above to the nasal notch, which supports the dorsum of the nose and the columna. In cases where the deviation extends far forwards, the upper end of the incision is made more anterior, but the lower end should always meet the muco-cutaneous junction. When the anterior slope crosses the median plane and projects from the other nostril, the incision is made along the line of crossing.

The elevation of the soft parts is begun near the upper end of the wound with the fine sharp elevator. As the perichondrium in this situation is separate from the mucous membrane, care must be exercised to insert the elevator under the perichondrium. If inserted between the two the separation is difficult; when properly inserted, the separation is easy and is accompanied by a peculiar gritty sensation which is characteristic. When the anterior slope merges by a gradual curve into the superior slope, the separation may be continued with the half-sharp or blunt elevator over the entire extent of the cartilaginous deviation, as far downwards as the edge of the cartilage, in other words, down to the oblique ridge. The separation of the mucoperiosteum from the edge of the crest below the ridge should not be attempted from above, as it is firmly attached to the crest, and the use of force at this point would result in tearing it. On the contrary, the sharp elevator should be inserted into the angle between the septum and the nasal floor, which may be readily accomplished if the incision along the muco-cutaneous junction has been made down to the bone. The periosteum is separated from below upwards until the crest is reached. It must be carefully cut from the layer of fibrous tissue between the bone and cartilage by means of the sharp elevator, as far back as the apex if possible. It can now be laid against the outer wall of the nose, where it may remain of its own accord, or it may be held back with a spatula, a retractor, or a small Bosworth speculum. If the cartilage project far down beyond the edge of the bone, or if the anatomical arrangement is so complicated that it is difficult to get one's bearings, the separation of this

lowest part of the mucous membrane may have to be postponed until after the removal of the cartilage.

The cartilage may be penetrated with a knife or a half-sharp elevator may be used to pick through it; but by far the safest method, as has been originally pointed out by the writer, is by the use of a curette. This instrument should be smooth and round, and not too small. With it a groove is scraped in the cartilage, just behind the incision, and this groove is deepened until the cartilage has been penetrated. This is indicated by the absence of resistance, by occasional slight bleeding from the opposite perichondrium, and by the fact that the next stroke of the curette will raise the edge of the hole in the cartilage. The hook-shaped elevator is now inserted between the cartilage and the opposite mucous membrane and, with the speculum in the other nostril, a slight elevation made by the hook can be seen. The separation can be continued around the hole in the cartilage under the guidance of the eye. If the groove made by the curette has sufficiently thinned the cartilage, it may be broken through with the hook; if not, the hole is enlarged with the cartilage forceps, until it extends the entire length of the incision.

The blunt elevator may now be inserted between the cartilage and the perichondrium of the hollow side. If the bend in the cartilage is not pronounced, the perichondrium can easily be separated from the entire anterior and superior slopes, but no attempt should be made to separate it below the line of adhesion to the bony crest.

The cartilage may now be removed with the Ballenger swivel knife. Dr. Ballenger directs that the instrument be inserted at the lower angle of the wound, that the prongs be made to straddle the bony crest, so that the blade lies flat upon the bone. As the crest is sometimes very wide, a very wide instrument may be needed. The width of the crest is, however, no indication of the thickness of the cartilage, as it is the side of the cartilage and not its edge which lies upon the crest. The progress of the blade is also obstructed by the irregularities of the bony surface. On the other hand, it seems to be better technic to use the narrowest possible knife, inserting it into the upper, rather than into the lower angle of the wound. When the blade reaches the vomer, the prongs of the instrument, resting upon the crest, act as guides to prevent the blade from catching. The strip of cartilage remaining upon the crest thus retains its original thickness and strength, and therefore is much more easily removed.

The removal of the strip of cartilage, can be readily accomplished by undermining it with the sharp elevator, or by moving the hook-

shaped elevator along its edge until a place is found where the hook penetrates easily between the bone and cartilage. The cartilage is then raised from its bed and removed with the forceps.

When the anterior slope is very abrupt, so that the angle between it and the superior slope is defined by a sharp vertical ridge, the separation of the perichondrium is not attempted behind this ridge on either side until the entire anterior slope has been removed with the cartilage forceps, and the hollow exposed. This is especially advisable in the traumatic cases, where there may be dehiscences in the cartilage, or where separate pieces of cartilage may be found between the mucous membranes. Such pieces of cartilage are carefully outlined with a probe, and exposed by cutting down upon them with a knife.

We now come to the removal of the posterior and inferior slopes, the bony parts of the deviation. All the writers on the subject seem to be agreed that this is the most difficult part of the operation; but they dismiss it in a few lines, without offering any solution of the difficulty. The fact that perforations are most frequently caused by tearing the mucoperiosteum at this stage of the operation, and that all operators report a certain percentage of perforations, even though only the largest tears result in this way, indicates that the difficulties involved have not heretofore been satisfactorily overcome. Therefore the writer, in the following description and demonstration on the model, hopes to make clear the methods by which he separates the periosteum, and by which he has succeeded in avoiding perforations at this stage of the operation.

The firm attachment of the periosteum to the bone is caused by two factors: first, the dense fibrous tissue on the top of the crest, and second, the serrations upon the edge of the crest. The fibrous tissue is firmly adherent to the top of the crest, and to the upper surface of the serrations. The periosteum is not adherent to the surface or edges of these serrations, but some of the serrations spread out in the periosteum in a fan-shaped manner, and all of them project upwards and outwards like a series of upwardly pointed hooks, which firmly hold the periosteum. Any attempt to separate the periosteum by pressing down upon it from above with any kind of instrument, will only tend to drive it more fixedly upon these pointed projections. If however, the crest is thoroughly scraped, and then the periosteum is raised from below, it can be lifted from these serrations with surprising facility. The procedure is as follows: After having located the top of the crest with a probe,

the fibrous tissue which lies upon it is incised with a knife along the center of the crest, the knife being carried into the irregular depressions on its surface. With a suitable instrument, the spade-shaped elevator being preferred, the fibrous tissue is scraped from the top of the crest, and from the top of the serrations which project from its edge, without making any attempt to get over the edge of the bone. When this has been done, the fine sharp elevator is inserted into that part of the primary incision which has been made along the muco-cutaneous junction of the vestibule. If this part of the incision has been carried down to the bone, the instrument finds its way easily, even though the bone may lie a considerable distance below the surface. The periosteum is not adherent at this point. The separation is continued upwards until the edge of the crest is reached, when, if the top has been thoroughly scraped, the periosteum will be found to be free. So easy is the separation when done from below upwards, that the periosteum of the inferior slope, from the primary incision to the apex, has usually been separated at the beginning of the operation, even before the removal of the cartilage. The separation is continued behind the apex with a suitably bent instrument. On the concave side of the crest, it is impossible to get below the serrations in the anterior part of the nose. We therefore take advantage of the fact that the fibrous tissue on the top of the crest disappears behind the apex, and that the separation is therefore easier in the posterior part of the deviation. In fact, if the flat elevator is inserted far back in the nose, on the vertical plate of the ethmoid, it may be carried downwards over the suture-line to the vomer without difficulty. The hook-shaped elevator is now inserted with the hook pointed downwards and held flat against the side of the vomer. It is brought forward along the crest until the bend of the hook becomes engaged underneath one of the serrations, when the periosteum may be lifted by an upward motion of the hook. A fan-shaped serration may be broken off with the hook. After the bend of the bone at the apex has been turned, the progress of the hook may have to be interrupted in order to scrape a neglected spot on the top of the crest. In short, the separation of the periosteum may be performed in a safe and expeditious manner by observing the following points: First, thoroughly scraping the top of the crest; second, working from below upwards; third, working from behind forwards; and fourth, combining the last two items in the use of the hook-shaped elevator, which is inserted behind and below the serrations. The separation of the periosteum from the surface of the

vomer below the crest, can be easily done with the blunt elevator, as it is not adherent in this region.

After having thoroughly cleared the bone of its periosteal covering, its removal is a very simple matter. It may be done with any kind of forceps that are sufficiently strong. The fenestrated forceps are the most powerful. The writer has recently devised an edge-to-edge forceps which serves the purpose well. If the spine is not too thick, it may be cut through with the Holmes middle turbinated scissors. If it is very thick, it may be necessary to use the chisel.

When the vomer is unusually bent, when there are exostoses near the apex or when synechiae exist, a decided advantage may be gained by the removal of the inferior slope at an early stage of the operation. For just as the anterior slope conceals the hollow of the cartilaginous deviation, so the inferior slope closes the hollow of the bend in the bony parts, and its removal gives access to the parts behind the apex.

With the removal of the inferior and posterior slopes, and a final trimming up of all pointed irregularities and projections in the cartilage and bone, the operation is completed.

When the anterior slope crosses the median plane and projects from the other nostril, the prominent cartilage may be managed in one of several ways. In young persons it may be left untouched; it will return to the median plane in time. In older persons it may be removed through an incision over its prominent part, in the manner in which it has usually been done in the past. When the external nose is also bent over, the bridge of cartilage between the spine and the nasal notch must be freed by cutting it from its attachment to the nasal notch by means of a narrow-bladed knife inserted between the mucous membrane, and from its attachment to the spine by breaking or cutting it. The nose is then held over with a strip of adhesive plaster.

The side of the nose operated upon is then packed in the following manner: A piece of gutta percha tissue is folded into a strip one-half inch wide and four inches long. This is inserted half-way into the nostril as a temporary protection to prevent the packing from entering the wound. Strips of gauze or strands of wool dusted with bismuth subnitrate as suggested by Freer, are then lightly packed into the nostril. The vestibule is filled wth cotton. Much may be added to the comfort of the patient if a piece of rubber tubing is included in the dressing. This is done by first packing the upper part

of the nostril, inserting a rubber tube about one-quarter of an inch in diameter, and then packing below and around the tube. No lateral openings are made in the tube, as it is not intended for drainage, but to enable the patient to breathe through the nostril.

If much bone has been removed, the reaction during the next 24 hours is apt to be pronounced. Iced applications to the outside of the nose, and a cold spray in the other nostril and through the tube will alleviate the pain, and reduce the swelling of the mucous membrane.

The packing is left in place for 48 hours. After its removal, the use of a saline spray is all that is necessary.

By the method above described, the writer has operated upon 55 successive cases. All but a few of these were extreme cases. Some were complicated by the presence of exostoses or synechiae. In one case the deviation extended through to the posterior border of the vomer. A few of the cases had been operated upon previously. The patency of the obstructed nostril was restored in all of the cases. There were no perforations.

Most of the operations were performed in the Throat Department of Mount Sinai Dispensary. For the privilege of devoting my time to this work in a very busy clinic, and for his enthusiastic co-operation, I wish to acknowledge my indebtedness to my chief, Dr. Emil Mayer.

616 Madison Avenue.

An Operation for Deviated Septum.—M. S. SCHIRMUNSKI.—*Monatschr. f. Ohrenh.*, Berlin, October, 1904.

The author makes a crucial incision with a specially devised punch and uses antiquated screw-clamps and tubes to hold the septum in place. The instruments and method have been familiar to readers of American literature for many years.

YANKAUER.

THE SUBMUCOUS RESECTION OF THE NASAL SEPTUM WITH BALLENGER'S SWIVEL KNIFE.*

BY JAMES F. MCCAW, M.D., WATERTOWN, N. Y.

Since hearing the remarks and having the pleasure of seeing Ballenger demonstrate the use of his swivel knife in the submucous resection of the nasal septum, at the last annual meeting of this society in Boston, I have taken it up with much enthusiasm as an operation well fitted to the correction of septal deviations.

In this short paper I will give my personal experience gained from sixteen cases operated on by me since July, 1905; speak of some of the important points and difficulties encountered, which have been brought out by other writers; and call attention to some difficulties liable to be encountered, mention of which I have not seen in my review of the literature of the subject.

Of the sixteen cases operated on, twelve or 75% were males, four or 25% were females. Thirteen were young adults, two were middle aged and one nineteen years of age. In seven cases, the deviation was into the left naris and in five into the right. Four cases presented deflections of the sigmoid variety: of these, three were vertical and one horizontal. None of my cases, could I say, were purely cartilaginous; one was entirely bony, while the remaining fifteen were osseo-cartilaginous. Of the two cases of bowed or "C" shaped deflections, one was extreme, completely occluding the nostril on the side of the convexity: the anterior inferior border of the triangular cartilage was dislocated into the opposite nostril and the tip of the nose deviated toward the convexity.

One large perforation occurred. In two cases the entire muco-perichondrial flap of the convexity was lost at the time of resecting the triangular cartilage, details of which will be spoken of later. One severe post-operative hemorrhage occurred. Regarding the etiology of deflections, my clinical experience leads me to endorse Freer's criticism of Killian's division of septal deviations into those due to faulty growth and those due to traumatism. In this connection Freer says, "It does not seem mechanically reasonable that force enough should be conveyed by the elastic cartilage of the septum

* Read at the meeting of the Southern Section of the American Laryngological, Rhinological and Otological Society, at Norfolk, Va., January 13, 1906.

to its bony skeleton to break either the perpendicular plate or the vomer. The fact, therefore, that a cartilaginous deflection is continued into the bone is to my mind an argument against its traumatic origin. I think, therefore, that while traumatic deviations occur, their frequency is over-estimated and that it is better to leave the supposed etiology of deflections out of the question in grouping and describing them."

The sitting posture for the patient has been used in all my operations, for the reason that the field of operation is more accessible, the operator is in a more comfortable position and can, therefore, manipulate his instrumeuts to better advantage. Besides the patient is not annoyed by secretions and blood dropping back into the post-nasal space.

I believe with Killian in the necessity for a thorough preparation of the patient. The face and vestibule of each nostril should be washed with soap and warm water and finally sponged with a bichloride of mercury solution, after first clipping the vibrissæ from the nostrils. A sterile sheet is then placed around the patient's neck and sterile towel about the head to protect the hair. All instruments and in fact everything coming in contact with the patient must be prepared according to rules laid down for clean surgical work. It is needless to add that the hands of the operator and his assistant must be surgically clean. For the above reasons and others which will be mentioned later, I think it preferable to do this work in the hospital where the patient remains over night and can return home the following day. This to many may seem an unnecessary amount of preparation and precaution, but those of us who have to operate in the office, without an assistant, with the probability of interruption and the necessity of hurry will readily realize the importance of it. Mosher in the Laryngoscope, November, 1905, sums up the situation very clearly when he says: "It is essential, however, that you have a quiet patient, that the operator be fresh, and that he be free from the pressure of a large waiting clinic. When the element of hurry comes in, it is common to perforate or lose the flap on the convex side." My method of anæsthetizing the mucous membrane differs somewhat from that used by most operators. I use a solution of Cocaine 1% in Adnephrin 1-5000 to first spray each nostril. This relieves the extreme sensitiveness of the membrane. I then use pledgets of cotton saturated with Cocaine 8% in Adnephrin solution 1-5000 to thoroughly pack each nostril over the entire area of deflection. This, I allow to remain fifteen minutes. As I begin

to apply the anæsthetic the patient is given Morphine sulphate gr. ⅛, by mouth. This method gives a profound local anæsthesia without the necessity of a second application. Although I have operated upon several excessively neurotic patients there has been an absence of cerebral excitement, fear, anxiety or syncope. This I attribute to the slow absorption of Cocaine due to my method of applying it in combination with Adnephrin and to the sedative and antagonistic effect of Morphine to the cerebral stimulation of Cocaine.

I am convinced that no one incision is capable of meeting the requirement of all cases, and I now vary my incision according to the requirements of the case in hand. In my first cases, Killian's incision was used exclusively. Now in the bowed deflections with dislocation of the anterior inferior border of the triangular cartilage into the nostril of the concavity, I follow Freer's advice and carry my incision along the free border of the cartilage, and another vertical incision over the convexity in the opposite naris. In crest-like deviations far back on the septum Freer's vertical incision in front of the deviation seems to be most desirable, giving a more accessible field of operation. For those deflections involving the greater part of the bony skeleton, his "L" incision can be highly recommended as being better fitted for this particular class of cases than any other we have tried.

The Killian incision has been used in the left nostril regardless of the convexity in all cases where the deflection involved the cartilage and only the most anterior part of the bony septum. In some cases, after begining with the Killian incision and finding myself handicapped for room to reach the most posterior limits of the deflection, I have made another incision, starting sufficiently far back on the septum to give a perfectly exposed operative field and cutting forward along the floor of the nose, joining the Killian incision at its lowest point. This gives a posterior flap which can be tucked up out of the way, allowing the operation to be completed under the eye of the operator, which is very essential to avoid perforations.

Too much stress cannot be laid upon the necessity for a thorough separation of the muco-perichondrium, *slightly beyond the limits of deflection,* otherwise there is the liability of perforation or the loss of the entire flap of one side during the resection with the swivel knife. This unfortunate accident occurred, as mentioned above, in two of my cases.

Ballenger has undoubtedly made a great advance in the element of time saving by the introduction of his swivel knife; but he has,

I think, placed the time limits for a complete operation, viz.: five to twenty minutes, too low for the average operator and I am thoroughly convinced that care, perfection of technique and thoroughness should not be sacrificed for time; for he who attempts to operate with great rapidity in small cavities like the nostrils, will surely come to grief in some of his cases. I believe, however, that we should work as rapidly as possible, consistently with care and thoroughness. After the thorough elevation of the muco-perichondrium from each side of the septum, a Killian's medium-sized speculum is introduced, one blade through the incision in the cartilage below the perichondrium, the other between the perichondrium and septum of the opposite side. By opening the blades of the speculum the flaps are ballooned. The swivel knife is now introduced astride the cartilage and forced into it along the floor of the nose for about ¼ inch so that the blade is beyond the free border of the perichondrial flap when the speculum is removed and the resection completed quickly. It is just at this step in the operation that my most disastrous results occurred, viz.: the loss of the flap from the convex side, which was due to an insufficient elevation of the muco-perichondrium over the convexity. The two cases in which this occurred were among my first five cases and were of very pronounced deviations in which I used the Killian incision and attempted to use only the Hajek straight elevators. While through a Killian incision one can thoroughly elevate the muco-perichondrium over the cavity with these elevators, it is for the writer at least, almost impossible to get around the marked convexities with this large straight instrument through this anterior incision, especially where the deflection is nearly or quite in contact with the lateral wall of the nostril. For this reason my elevation was incomplete in the cases referred to and in the resection with the swivel knife it perforated and caught up the flap at the point of attachment to the convexity and cut it along the line of the resected cartilage, so that on the removal of the piece of cartilage the mucous flap came with it. While this may seem an unusual complication and one easily avoided with ordinary care, the fact that it has occurred is sufficient proof that it is likely to occur again. As I have not seen any reference to this mishap in the literature reviewed it seemed wise to call attention to it. In these cases I now use the L incision and Freer's slightly curved blunt elevator which is thin and will hug the convex surface of the cartilage very closely, and by working slowly and cautiously the muco-perichondrial elevation can be safely made without perforation.

In the removal of the bony deflection, the writer follows the advice of Freer and after assurance that the bone is completely freed of its periosteum on both sides, the deflection is followed back and bitten away with forceps until every vestige of the deviation is removed. It was in my attempt to follow back a very pronounced horizontal deviation in firm contact with the middle turbinate bone that my only perforation occurred. It being far back and high up on the septum no scabbing or untoward result followed. The chisel and mallet have been used to remove the deviated portion of the crista incisiva after first thoroughly elevating its periosteum. This, except perhaps, at the extreme anterior end, the writer has not found difficult.

A word concerning the packing of the nostrils. Most operators advise packing both nostrils lightly and Freer only on the side of operation. The author has been following the former advice without the slightest trouble from bleeding until my last or sixteenth case, in which there occurred a very alarming hemorrhage about three hours after the operation, the patient losing an unusually large quantity of blood before the writer reached him. From this experience I have resolved to use a snug packing in each nostril for twenty-four hours, at the end of which time it can be removed from the unoperated nostril, the other remaining, if it seems wise, for twenty-four hours longer. There can be little harm to the patient in a firm, snug packing for this length of time and it will certainly give to the operator a great sense of security from the probability of post-operative hemorrhage.

The after-treatment is simple and is merely that of cleanliness and protection until the wound surfaces heal.

One strong point in favor of the submucous operation and which recommends it aside from the fact that it more thoroughly corrects deviations than any other with which the writer is familiar, is the slight reaction and complete absence of discomfort afterwards.

The immediate result in all my cases has been ideal, but as to the permanency, I cannot yet speak, for the time elapsing since the operation on my first case is only about six months. In the two cases in which the flaps were lost, there has been some annoyance from dryness and slight scabbing, but this is now improving.

Freer in speaking of the possibility of damage to the nasal profile says: "Some operators hesitate to adopt the window resection, urging that though it does not itself cause the bridge of the nose to sink in, its support is nevertheless weakened, so that a blow on the

nose would readily flatten it." Four cases are cited to show that although complete resections were done in each and each received severe blows on the nose seven days, twelve days, two and a half years and three weeks respectively after the operation, no deformity or damage to the profile resulted. One of my cases in which a complete resection had been done was playing with his baby when he received a severe blow on the nose from the baby's head four days after the operation. Two weeks later while working around his pleasure boat he raised his head quickly from a stooping position and received a second severe blow on the nose from a cross bar. Aside from some bleeding and slight swelling no injury to the nasal profile occurred. From the above experience it would seem that the danger from that source, although possible, has been overestimated.

Although Kreig and his followers sacrifice the flap of the convexity, the two cases of mine in which this happened I consider partial failures. These failures have taught me more about the submucous resection of the nasal septum than fifty successful cases without a failure could possibly have done.

From the limited experience which I have had my conclusions are:

(1) The operation can best be performed in a hospital where attention to the details of preparation can be thoroughly carried out, where trained assistance is at hand, and where the patient can be kept quiet for the first twenty-four hours.

(2) All effort must be made to have a quiet patient. Thoroughness must not be sacrificed for the element of time.

(3) Strong solutions of cocaine have not been found necessary, as profound anaesthesia can be produced by my method, and with the addition of the morphine, the operation can be completed without a second application, and without the fear of having to stop the operation on account of the extreme excitement or syncope which sometimes occurs where stronger solutions of cocaine are used.

(4) No one incision is applicable to all cases and the incision must be varied according to the indications of the case in hand; the idea being to give the greatest possible freedom to the field of operation.

(5) The lighter and more delicate elevators of Freer are applicable in the greatest number of cases, but in suitable cases the elevation can be made more rapidly with the Hajek instrument.

(6) Ballenger's swivel knife is the most satisfactory instrument for resection of the septal cartilage: doing it quickly, neatly and with the preservation of the specimen. It is certainly an advance in this particular step of the operation.

(7) Alarming hemorrhage, though infrequent, may occur; therefore, a snug packing in each nostril for the first twenty-four hours seems advisable.

(8) From the patient's standpoint the minimum amount of reaction and complete absence of discomfort is a favorable commendation and justly deserves our consideration.

(9) The results are ideal and the operation in the writer's opinion, is destined to supplant all others in dealing with septal deflections in their manifold varieties.

Retinal Changes in Ear Diseases.—FRITZ TENZER.—*Arch. f. Ohrenheilk.*, Leipzig, Oct., 1904.

From an analysis of 76 cases the following conclusions were drawn:

1. In extradural abscesses changes in the retina are rare, and when they do occur are mild.

2. In 31 cases of leptomeningitis retinal changes were found 11 times. Not all of these 11 cases died, and some of the cases in which no retinal changes were present ended fatally.

3. Retinal changes occurred twice in 12 cases of uncomplicated sinus thrombosis, and 7 times in 23 cases of sinus thrombosis complicated by other intracranial lesions.

4. In 14 cases of cerebral abscess, retinal changes were present in 7 cases; in 12 cases of cerebellar abscess retinal changes were found in 8.

The author states that severe intracranial lesions may exist without even the slightest congestion of the retina; on the other hand, when well marked optic neuritis or choked disk are found, the existence of some intracranial complication may be regarded as certain, although the latter need not be of unusual severity.

YANKAUER.

SOCIETY PROCEEDINGS.

THE AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

SECTION ON OTO-LARYNGOLOGY.

Tenth Annual Meeting, Buffalo, N. Y., September 14-15-16, 1905.

H. W. LOEB, M.D. (St. Louis) President.

(Continued from page 255.)

Malignant Disease in the Nose, with Report of Cases. By C. L. MINOR, M.D., Springfield, Ohio. *(Published in full in* THE LARYNGOSCOPE, *page 917, Volume XV.)*

DISCUSSION.

DR. BECK: There is a great deal that may be said about this paper, but at the same time in discussion I would simply say it is a very clean report. I have studied the clinical report, I have studied the paper and the microscopical sections which were sent to me about a month ago; and I find that, according to the labeling of the slides and the report, they correspond, that the diagnoses are correct. I wish to say, however, that on that point there is a great deal of discussion, and particularly Kyle calls our attention to the indiscriminate diagnosis in scrapings of the nose in sarcoma. When there is some difficulty in making a diagnosis histologically between syphilis and sarcoma by simply examining scrapings, it is necessary to remove a sufficient part of the tissue and make a satisfactory slide. Dr. Minor's sections were certainly large enough to enable one to tell that the condition was sarcomatous and carcinoma.

As to the result of the treatment in these cases, it is too early to say that they are cured. If one takes a case like Price Brown's recently reported after several years, having reported it three or four years ago and again the other day, and which he reports as still remaining cured, such a report is of some value. But in these cases the time is too short.

The post mortem examinations which were made in this case were of some value, and add to the clinical value of the reports.

I would like to add in connection with the treatment, post operative treatment, in cases of sarcoma, tuberculoma, infectious granuloma of all kinds where malignancy is suspected, that we are able to use the ray treatment, the X-ray or other method of treatment in stopping or preventing the recurrence of the growth. I am quite anxious to see what theory they have here in Buffalo in connection with radio therapy so far as the intra-nasal disease is concerned.

In this connection, I take the privilege of reporting a case of sarcoma of the nose, that Dr. Ballenger referred to me for treatment with radium. He had operated originally by the mouth, but later by turning down the nose, making a cross incision across the bridge of the nose and thoroughly cleaning out the intra-nasal cavity of pure sarcoma. Following this operation, I used the radium intra-nasally with the satisfactory result that a year has passed and there is not the slightest trace of recurrence of sarcoma.

This is, of course, not unique. It is reported by others and Dr. Freudenthal was to have told us something about it this morning. I am sure he has cases of a similar kind.

DR. MAYER: It does seem as though we should draw the line between the four cases presented, two cases of ordinary myxomatous polypi undergoing probable changes, while the other two were cases of undoubted malignant disease. It is important this should be done for the reason that the literature becomes rapidly burdened with reports of cases of malignant disease not absolutely substantiated, and for that reason I call attention to this particular point. That ordinary myxomatous polypi may undergo these changes has been demonstrated more than once. I presented some time ago a case of myxomatous polypi where it was impossible to do anything short of a radical operation. In this case I made an incision along side of the nose through the upper lip and drew the nose to one side and removed a mass of myxomatous polypi large enough to fill an ordinary Mason jar. The examination showed in this case, similar to the first case here recorded, that we had myxomatous polypi undergoing malignant degeneration.

DR. BROWN: I might add a report to show the fatal termination, and its rapidity, in a case of sarcoma of the antrum. The case was brought to the hospital during my service there with a history of pain in the eye and over the antrum of Highmore. The case had been observed just two weeks before and was brought to the hospital. There were marked exophthalmus of the left eye

and considerable swelling over the antrum. The diagnosis was made of sarcoma. A radical operation was performed; the superior maxilla was partly excised, taking out one-half. The operation seemed to give almost immediate relief from pain to the eye: but at the end of two weeks, during which time the patient remained in the hospital, there was a recurrence. The eye again bulged out and there was practically no hope. The girl went home and died in about two weeks, giving the length of life of about six weeks after the disease was first noticed.

Dr. Spohn: Mr. Chairman, the paper was very interesting to me. I have seen quite a number of those cases; and all the cases operated upon died soon after the operation. I can not understand why physicians persist in operating upon these malignant growths, when they know the patient is going to die very soon afterward. The general rule is they die much earlier if they are operated upon than if they are let alone. I have observed frequently where the X-ray was used before operation and soon after operation, that the results were just the same as those given by Dr. Beck. I have been using the X-ray on a number of cases, not only in the face but in other regions of the body also, with the most excellent results. If the X-ray is used a short time before operation until the system is under the influence so to speak of the X-ray or whatever its action is on the general system, and then after the operation we get some results. No one can tell what the future will be in these cases; but some of them have gone two and three years, without recurrence.

To repeat: I cannot understand why a surgeon should want to disfigure the face, when he knows his patient will die soon, and an operation will only shorten life. I think it is a wrong position for physicians to take.

Dr. Stein: This paper unquestionably opens a most interesting field for discussion. It is probably beyond our time. But the question of malignancy in the nose is without a doubt of immense interest, partcularly when it comes to paying something for such a case. I am particularly struck by the divergence of opinion that exists between rhinologists as to the method of procedure to be resorted to. There seems to be a tendency nowadays, more or less, to radical treatment in performing operations, particularly as practiced by the general surgeon. The rhinologist tries to confine himself as much as possible to intra-nasal work, which is of course proper if it can be done to the satisfaction of the patient. When I

was in Toronto a few days ago, I had the privilege of seeing the two cases of Dr. Price Brown referred to by Dr. Beck. I was in his office and saw one of them while there. One of them had been operated upon and presented before the American Laryngological Society. The case had been reported there I think a few years before. This young man he told me, and the young man substantiated it in my presence, presented all the typical facial deformities of a marked case of malignant growth of the nose, the exophthalmos, the frog face, the pressure on the palate, complete occlusion of the left nostril and other such obstructive signs. I looked into the young man's nose and examined him very carefully and I was surprised to see what a wonderful result Dr. Brown had obtained by this method that he is so enthusiastic about, and which is well known, that of ignipuncture with the electric cautery. It is true this case at present shows a constant recurrence. There is a small sized recurrence about the origin of the Eustachian tube on the left side. It is very small. The Doctor very kindly operated while I was there, and I saw him introduce his electric cautery six or eight times into this mass; and he says the following day he has the patient come in, and he removes the slough, and the patient has no inconvenience whatsoever. In fact, he has never been inconvenienced from his work more than one day. At one time he had a hemorrhage in his office after the operation, but at no other time has he been inconvenienced at all. The Doctor has had this case under observation for four years. Now, that is a really remarkable result from such a procedure.

The other case he has is one that has been living for ten years and shows no signs of recurrence whatsoever. If we can attain such results by such measures, ignipuncture or some similar method, certainly it seems far preferable to the more radical surgical procedure. If I mistake not, Dr. Loeb, our president, treats such growths by intra-nasal operations, by a process of morcellation or picking out or gouging out as much of the tissue as he can and he gets no bad results; at any rate, no deforming results, and his patients seem to live longer than those operated upon more radically.

Dr. Minor closing: I think that my position will be more clearly defined by finishing the reading of my paper. The object in presenting the first two cases was to bring up the point of a change from a benign to a malignant growth. I believe that such changes can and do occur.

In reference to the criticism in operating on cases of malignancy, I do not believe that any one would operate on a patient *in extremis*, but I feel we are fully justified in operating to relieve from the intense suffering although we know that we can not arrest the development of the disease.

Some Observations on the Fossæ of Rosenmueller. By THOMAS L. BRUNCK, M.D., Decatur, Ill. *(To be published in full in a subsequent issue of* THE LARYNGOSCOPE.)

Physical Examination of the Mastoid. By ALBERT H. ANDREWS, M.D., Chicago, Ill.

Some Displeasing Results of the Mastoid Operation. By J. A. STUCKY, M.D., Lexington, Ky.

The Front Bent Gouge in Mastoid Operations. By W. S. BRYANT, M.D., New York. *(Published in full in* THE LARYNGOSCOPE, *page 796, Volume XV.)*

Contributions to the Treatment of the Diseased Attic. By F. C. HOTZ, M.D., Chicago, Ill. *(Published in full in* THE LARYNGOSCOPE, *page 784, Volume XV.)*

DISCUSSION OF PAPERS OF DRS. ANDREWS, STUCKY, BRYANT AND HOTZ.

DR. BALLENGER, Chicago, Ill.: The whole question, to my mind, embraced in Dr. Hotz' paper, in so far as I heard it (I did not hear all of it) is embodied in one proposition of what constitutes cure. It seems to me that question will have to be settled before we can arrive at any clear conclusions as to our estimation of the comparative values of the methods of treatment that are in vogue, those that have been advanced by Dr. Hotz in this paper, and those held by other operators. I have seen cases that seemed to be cured for one, two or three years, that were not cured at all. They did not happen during that time to be infected, and therefore did not send forth suppurative secretions. During all that time, however, in some of these cases there was undoubtedly necrosis which was gradually extending, without suppurating infection. There came a time, when necrosis of the attic or of the antrum was extensive and the whole necrotic area, which was now enlarged, became infected, meningitis developed and death followed. I have known of three such cases under my own observation, in which I am thoroughly satisfied that that was about what happened. So that if a case is apparently cured it is not necessarily actually cured.

To my mind necrosis of bone tissue does not often disappear without surgical interference of a rather radical sort. I mean by that, that the necrotic area should ordinarily be inspected or be subjected to observation in order to be sure that the cure has occurred. I do not mean to say that cures cannot occur wthout actual visual observation. I have had cases in which there was no operation performed in which sequestra of bone were thrown off in the form of bone dust, that finally healed over and were thoroughly cured without operation, even to the extent that Dr. Hotz has recommended in this paper. But on the other hand, I have seen cases that seemed to be cured that were not cured and in which the patient subsequently died. So I have a little dread in these cases where I think there is necrosis, where there is evidence that there is bone necrosis, and I have a little dread of allowing the case to be dismissed as cured until I have actually observed the diseased area, and have subjected it to such operative interference as seemed wise on actual observation.

I will state, however, that Dr. Hotz' paper is certainly a decided encouragement to us to be slower in opening mastoids where we are sure that the necrosis is limited to the attic. According to my observation, however, in the cases that I have operated upon, it is rare that I find necrosis in the attic that I do not find associated necrosis in the antrum. Such cases, however, exist. But the majority of the cases that I have seen have had necrosis in the antrum when there was necrosis in the attic.

DR. STUCKY: Dr. Bryant's paper leaves very little for me to add. Anything that offers more accuracy and enables us to facilitate the operation upon the mastoid is worthy of our closest attention. I have investigated this instrument a little bit and tried it on some hard wood and am sufficiently pleased with its operation to try it at once. Dr. Bryant is a close observer. I should be willing to take his word for it. Anything he says I regard as about true. I shall take pleasure in trying this instrument.

DR. HOTZ: I have listened to Dr. Stucky's paper and I have come to the conclusion that I must be an exceptionally fortunate man, for among all the displeasing results enumerated by the essayist I have experienced none in my own practice. I have never lost a case among my mastoid operations; I have never had a facial paralysis, no persistent granulations, and all that sort of things. Now one of the reasons probably is that I must have been fortunate

not to have got under my care very desperate cases with extensive caries, necrosis, destruction of the bones, to lead to such displeasing results under the best of care and skill of the operator. Another reason perhaps is, and the Doctor referred to that point, I have from the very beginning of my practical career, insisted upon early operation. In fact, I believe I was one of the first who advocated the early mastoid operation in acute suppurative otitis. Not to wait, as was the habit and the teaching of text books at that time—it was away back in the 70's—for the opening of the mastoid until serious threatening head symptoms set in. I followed the principle of the surgeons: Wherever there is pus give it an outlet as soon as possible so as to obviate its burrowing somewhere in a different direction from what you want it to.

The question that Dr. Stucky touched upon is only: When is the proper time? How early to operate? Now I think in acute cases, this can definitely be settled. Of course, we all know that in violent, acute, suppurative otitis media there is the mastoid involved, and it shows usually by the external symptoms of some swelling, some redness, some tenderness, but we also know that with the subsidence of the middle ear inflammation very frequently, in a majority of cases, the mastoiditis subsides and the symptoms disappear. But when the symptoms of otitis subside and the symptoms over the mastoid persist, we are entitled to perform the operation. And also, if the otitis goes on and the mastoid symptoms persist and the inflammation cannot be reduced by local treatment, it is no use to wait any longer.

The one instance in which I ran pretty close to a displeasing result was one of those cases in which the operation of the mastoid had been delayed too long. A woman contracted a violent otitis with mastoiditis; and although the doctors always talked about performing an operation, they did not do it. Finally they sent the patient up to Chicago to our hospital, and when she came there was an immense swelling and fluctuation over the mastoid. We put her right on the operating table and operated. An immense amount of foul pus was evacuated; the outer plate was partly destroyed by caries; and the mastoid bone was converted into a large cavity. Scooping out the soft granulations of the walls, all of a sudden a gush of venous blood came and I knew the sinus was opened. I plugged it, finished the operation and put on a dressing of iodoform gauze. The case in four or five days developed chills; but

the mastoid wound showed a healthy action and apparently there was no evidence of pus retention anywhere. The woman developed a cough and pulmonary symptoms, from pyaemic affection evidently, and afterwards she was transferred to the surgical clinic on account of pyaemic inflammation of the knee joint, and a metastatic inflammation was also developed in the ankle joint. Wonderful to relate she survived and got well.

DR. BALDWIN: Just one point which may be of interest. This summer I saw a case of acute mastoiditis which was in all probability due to a non-erupted wisdom tooth. The patient was a woman 38 years old who had not erupted either of her lower third molars; and there was every evidence of acute mastoiditis. A dentist was called and there was no wisdom tooth found as the cause. After the acute symptoms subsided I investigated, cut down and found the tooth without any trouble, evacuated some pus and I am in hopes the tooth will come through and the ear give no more trouble.

DR. ROBERTSON: Dr. Stucky's persistent cases suggest that necrotic tissue still remains. That is an indication I should expect. If I had a case where the granulations persisted, I should be pretty sure that I had not removed all the necrotic tissue. A case came to my notice some time since with a very peculiar condition that I should like to mention at this place as one of the things that may happen following mastoid operation that we are not looking for. I operated upon a woman for mastoiditis, and thought I got all the tissue that should come away, and packed the wound with iodoform gauze. On the next day, the case developed an iodoform dermatitis which changed after one or two days into erysipelas. On consultation with some of the dermatologists, the question was brought up whether a dermatitis set up by iodoform gauze could result in starting a streptococcus infection. The dermatologist I talked with thought it was very plausible. Referring to Dr. Hotz' paper I do not think we should decry any operative procedure on account of dilatory treatment by any one particular man. Granulation tissue without suppuration, we may have in a mucous membrane. But granulations with suppuration, especially this ropey clear discharge he speaks of in his paper, I never experienced without at least some necrosis. Sometimes it is only about the edge of the tympanic membrane, but there is always necrosis. In those cases it is always our duty to enlarge a perforation in the drum membrane; as the one treatment in all cases of granulations in any part of the body is simply a matter of drainage, and the gauze drain as we ad-

just it now, of course, does not reach into the attic. But we can put it in the attic if we wish. Years and years ago in the clinics of Europe, you will all remember those little plugs of iodoform gauze which they used to use in a little tuft for putting up into the attic. Nearly everybody has a little instrument for putting it there. I have had one for fifteen years. These plugs are inserted into the attic. The attic is nearly always necrotic; and in very many cases it is absolutely impossible to get up there unless you remove the superior part of the tympanic ring. It is not always necessary to have pus to have a bad mastoid. Especially is this true of tuberculous patients. You may not have any symptoms at all and still have a necrotic mastoid or a necrotic attic and it will not get well no matter what the treatment is or who the man is that treats it, with medications. It is the duty of every otologist to treat the attic in all cases of suppurative otitis because the lower part is not the part where the suppurative process is situated. It is in the attic itself. The most dangerous disease I know of next to the tubercular disease of the mastoid, is that sequella of the grip. In those cases we will have suppuration of the middle ear then cessation of symptoms with necrosis of the attic and mastoid cells. In the cases I have seen, the symptoms had already subsided, and all of a sudden broke out anew, and when the operation was performed you would find the whole or a large portion of the mastoid process was necrotic.

Dr. Foster, Denver: We have had presented to us two very different sides of this question and I am inclined to think that many of us will be inclined to share Dr. Stucky's feeling in the matter. We are not warranted in feeling that we can have absolutely no mishaps, if many mastoid operations are done. Notwithstanding the best of care and often the best of technique, we will sometimes have happenings that we do not want and do not look for. I do not have to go back very far to remember a case of facial erysipelas commencing the second day after operation, which tore open the wound and gave a great deal of trouble. Another case after apparent healing, on the twenty-second day after operation, developed a well marked facial paralysis. Fortunately this was due to a swelling near the angle of the jaw and pressure upon the facial nerve after it came out of the stylo-mastoid faramen. I don't know of any indication during the operation that should have warned me of the case or two that was followed by thrombus of the lateral sinus. These inclined me to doubt that all our cases are likely to go on to uneventful recovery. On the other hand when things go smooth they are certainly very smooth and the results are very gratifying.

As to the time of operation in acute cases, it is very well agreed that it should be early. Marked external symptoms are not necessary to make the diagnosis and to demand an operation, especially in cases where we find bulging of the posterior canal wall and intense pain which is not relieved. Dr. Andrews' stethoscope and transmitted light, I am sure, will help us still farther in advising for or against the operation. I am inclined to believe that the cases in which Dr. Hotz has had such eminent success in the chronic variety, must be attributable to the disease lying almost entirely in the ossicles, for I cannot conceive of this treatment curing a necrosis or caries of the antrum or wall of the tympanic cavity. It seems too that there is a possibility that, in some of these apparent cures where the patient leaves for any reason and returns in four or five months and says that there is no discharge, he is mistaken, and there has been and still is a very slight amount of purulent matter which constantly remains on the floor of the tympanum, not enough to flow out, but just enough secretion to equalize the evaporation.

One cannot help but feel the responsibility we assume when we insist upon a patient having a radical mastoid operation, for while the results are excellent in a tremendous majority of cases, yet they occasionally take a bad turn and leave us in doubt as to whether our advice in this special case was wise. Still we must assume this responsibility, for it is far more dangerous to let this chronic discharge and necrosed bone continue than it is to operate.

Dr. Stein: Any means, in my opinion that will aid in our diagnosis of ear diseases is worthy of our attention. The aids to diagnosis introduced by Dr. Andrews this afternoon are of great value in many cases. But like all such instruments they have a limited value, as stated by the essayist; and I refer now particularly to the trans-illuminating lamp. One of the limitations for the trans-illumination is where we have very little or no involvement of the mastoid process; but involvement of the middle ear and its accessory cavity, the antrum, sufficient to warrant a mastoid operation. We see such cases frequently and we operate upon them, and I have used the trans-illuminating instrument as a matter of routine in a good many of my cases, and have watched carefully for this sign of light transmission. I have noted in such cases as I have referred to just now, where there was no involvement of the mastoid but extensive involvement, as far as pus and granulations were concerned, of the middle ear, the attic of the middle ear and the an-

trum, that we should be somewhat deceived on account of the transmission of light into the auditory canal.

As to the auscultation method; at the time Dr. Andrews read his paper at Cincinnati, I believe I put on record a case in which I was deceived by this means or aid to diagnosis, owing to a large cavity quite deep in the mastoid process. In fact it involved the cells in the posterior part of the process, posterior to a plane of the digastric fossa. But the cortex of the mastoid was excessively thick so that when I auscultated, the sound duration was equal to that of the opposite side and within the range of normal conduction. I do not remember exactly what, but about 20 seconds, I think. I was interested in the instrument at that time and noted it particularly; and when I did open the mastoid I found this very thick cortex and thought probably I was going to find nothing but an eburnated mastoid, when suddenly I entered a very large abscess cavity, very deep down. In cases such as these two we are liable to be misled by these aids to our diagnosis.

The paper of Dr. Hotz I think was a very happy ending to the symposium of mastoid operations, because it puts a check somewhat upon a tendency to too radical work in many cases, particularly by some of our members who come here and whose work in this line has been rather limited and who become enthusiastic after hearing the papers read here in which the authors report cases numbering into the hundreds, and feel as if it were almost a duty on their part to return home immediately and do some mastoid work on the first indication.

I want to say a word in regard to Dr. Stucky's paper. I was particularly impressed with the statement he made about having forty per cent of his cases show such marked external manifestations of internal involvement of the mastoid. Although we all see that occasionally I do not think many of us see it to such an extent. To my mind it indicates a need for education in the State of Kentucky, both among the laity and the profession. (Laughter.)

DR. TIMBERMAN: I fancy that early in our career before we have had very much exerience in radical mastoid operations that our estimation of a man is formed a good deal by his ability to operate. That is, we think a good deal of a man who can perform a mastoid operation. I know I felt that way, but after about ten years of practical experience in handling these cases, I have come to regard the man of some worth who can take up the after-treatment successfully. If I had to choose between a good operator and a man who was

perhaps not so skillful in the operation, but who knew how to conduct the after-treatment, I would take the second man every time. I am sorry that this afternoon we have not had a little bit more of the actual technique of the after-treatment of these cases, because here is where we have our trouble. Grunert says: Let no one think that after the operation is done the after-course of the cases is easy. Our work has just begun. Our hard work has just begun. I must say that for myself, I have not had so many of these unfortunate sequelae that we have heard of here this afternoon. I have had some of them; but when I have had them, I have nearly always demonstrated to my own satisfaction, that I am myself to blame. For instance, if I have a case that suppurates for a long while, I think something is wrong with my after-treatment; and I have definitely demonstrated that to my own satisfaction. I leave my cases, as I suppose most of you do, three or four days before I make my first dressing. Immediately after the operation I swab out the whole ear and mastoid cavity with one to five hundred solution of mercury bi-chloride. The fourth day in making my first dressing, I generally have some odor, as I presume most of you have. That settles it then and there usually. There is only one class of exceptions to that in my own experience, and that is in those cases which are due to the lowered vitality of the parts; granulation is unfavorably progressing and needs more than the ordinary packing. I never use iodoform gauze except in cases of lowered vitality of the parts. Otherwise I pack them with gauze strips or small pieces of gauze wrung out in a one to five hundred soluton of bi-chloride, in other words I pack with bi-chloride gauze, and that will stop the suppuration if we have done our work well during the operation and gotten away with the necrotic tissues. Persistent granulations, persistent suppuration may be due to an oversight on the part of the operator in failing to eliminate or eradicate some little point of necrosis; or secondly, it may be due to the covering over a not entirely healthy part of bone by the granulation tissues and superficial necrosis going on under the new formed tissue. Or thirdly, we may overlook a little fibre of the gauze, which becoming embedded in the granulating tissue will later set up trouble, and we think then we have some bone necrosis, when in reality we have not.

DR. SHERMAN: When I left my home it was with the firm resolve that I should observe the senatorial custom of keeping silent on the occasion of my first visit to this Academy. But I should do

too great violence to my feelings if I did not express my full appreciation of Dr. Hotz' position. I believe the radical operation of the mastoid is entirely unwarranted in the great majority of cases that are operated upon. I believe that the first duty of the operator is to recognize that it is his purpose to remove all the debris of the middle ear in these cases of chronic suppuration. I believe the object in the greater number of cases of otitis media suppurativa with which we have to deal, is to prevent an extension of that disease to the mastoid. I believe the great mass of mastoid complications, is the result of neglect or faulty technique on the part of the operator. I have had no difficulty in the large number of cases that I have been called to operate upon, to find in the armentarium of the dentist, instruments admirably adapted to the curettage of the middle ear. I have never permitted myself to operate on the mastoid unless it was a condition of last resort. I have had many of these cases to deal with. When I have operated upon them, I have met with fatal results. I have opened the sinus; I have had facial paralysis; I have had all the complications that anybody has had, and I regard myself fairly skillful as an operator; but we all know there are anomalous conditions which are entirely beyond the power of any man to recognize. The great difficulty in curetting the middle ear is that one cannot curette the anterior wall. To obviate that difficulty, I take a small chisel which I find among the dental instruments, and cut away that triangular section of bone permitting me to reach every part of the middle ear without difficulty; and after curetting that thoroughly, using formalin, from one to ten per cent, I very rarely have occasion to do more than to congratulate myself upon the result. Whenever I have an acute mastoiditis to deal with and periostitis, I never operate until first I have thoroughly exhausted every other method of drainage through the middle ear and applied ice compresses and leaches. I have had very young children to deal with; I have had people eighty years old to deal with. I have seen conditions which would make it almost criminal for a man not to adopt the radical operative measures adopted by our advanced thinkers and operators of today, and yet, for one reason or another I have not been permitted to operate upon them and they have gotten well. Just the same question arises, that the surgeon has to deal with in appendicitis. We all know that eighty per cent of the cases of initial appendicitis recover whether operated on or not. And while I am particularly sensitive upon that point, having had an extraordinary

experience in my own family, the pendulum will surely swing the other way. There are many reasons why it is not fair to an intelligent and conscientious surgeon, or to a sensitive patient, to produce the conditions which result from the ordinary radical mastoid operative measures. I coincide further with the position that has been taken that if you operate intelligently and persistently by removing all the debris of the middle ear, you rarely have occasion to deal with mastoiditis unless it is a case of extreme neglect, or an acute infection.

Dr. Murphy: In reference to the chisel or gouge of Dr. Bryant, we all recognize the importance of avoiding as much concussion as possible in doing the mastoid operation, as we are dealing here with a diseased condition and a diseased brain, and we know that the less concussion there the better. Several years ago I had quite a talk with Prof. McCune whom we all know as a past-master on these operations, and he condemned all chiselling very vigorously. He resorts to a drill entirely in opening the mastoid. I have been looking for something to take the place of the chisel and the mallet, but nothing has been so very satisfactory yet. Randall of Philadelphia got out a set of several gouges which he can operate without the use of the chisel and mallet. I have tried them, but they were not a success in my hands. The mose successful instrument in penetrating or opening the antrum I have found, is the Russian perforator. Dr. Ballenger was one of the first men to call my attention to it. That is a very useful instrument in properly selected cases. I shall get one of Dr. Bryant's gouges, and would like to have him demonstrate in what manner it is best used. In reference to the unpleasant effect of mastoid operations, I think the majority of us have some of these bad results, especially those who are doing hospital work, where the after-treatment often has to be left, more or less, in the hands of the interne. It is an exceedingly difficult matter to instruct an interne in the proper packing of these cases. It matters not how skillfully the operation may have been performed, or how thorough you were; if your packing and after-treatment are not carefully attended you are almost sure to get unfavorable results. We can realize how difficult that must be in the hands of an interne who is not experienced in the operation, when we think how difficult it is to take a case in which another man has operated and that has been turned over to us for treatment. That frequently happens where my predecessor has operated on a number of mastoid cases before going off service, and I have

had to follow without any knowledge of what the operation was, or what conditions were present. These cases, unless the greatest care is exercised in the beginning in the toilet and the cleansing of the mastoid, are almost sure to show some unfavorable sequela. I think Dr. Hotz' paper was very opportune, in that it gives us the conservative side of these cases. We should not be too hasty in our operations as we all realize that care and pains, taken in the proper curetting and clearing out of the diseased area, may frequently save the mastoid from an operation.

The suggestions in Dr. Andrews' paper on the subject of transillumination have been very instructive. I have worked that somewhat, but not as thoroughly as I hope to do from now on in view of the very good results the Doctor has given us.

DR. BANE: In the electric lamp Dr. Andrews has shown us, we shall find a very valuable help in cases where we can make use of the electric light.

Dr. Hotz is to be congratulated in doing so much mastoid work and having no deaths. My impression is that the gouge Dr. Bryant has presented here, is a dangerous instrument, one that you can not very well control. It is too long. I believe that in the McKernon instrument you have one that is much safer and one with which you can accomplish quite as much as with the gouge, and be less liable to accident. About three years ago, Dr. Randall called my attention to the McKernon bone spoon, and the gouge that is attached to a similar handle. But as the gentleman from Ohio, who has just spoken, has said, I was not able to remove all of the eburnated bone with either a gouge or a McKernon bone spoon, but had to resort to the chisel and mallet. It is true that in those cases we get a good deal of jar, and the patient suffers with headache for twenty-four hours afterwards on account of the jar. I like the Russian perforator very much for entering the antrum, especially when the bone is eburnated.

DR. FOSTER, Kansas City: I desire to make a few brief remarks upon one subject. I have noticed that in the closing of a wound, some of the general surgeons in Kansas City removing goitres, use subcutaneous sutures, without any scar whatever. I thought it would be a good idea to try this in closing the wounds in mastoid cases. I have only tried it in one case, which was a perfect result. The suture is an interrupted suture. It is buried under the skin entirely, and you bring it together in this position, and when you wish to pull it out it is all at one end; you draw the entire suture

out, and there is no scar tissue left whatever. I asked Dr. Ballenger if he had tried it, and he said he had not. I would be glad if some of you gentlemen would try it and let me know the result.

DR. DEVILBISS: I only wish to say one or two words in regard to the technique in the use of the Randall gouge and Dr. Bryant's instrument. The Randall instruments are short like the engraver's tools, and should be handled exactly the same way that the engraver handles his. The finger will always prevent the accident which happened to Dr. Smith if he uses his tools in that way. You will not go too far.

In handling Dr. Bryant's, if you take it in the left hand with the finger just around the curve, and then work it with the right hand, the left-hand finger will always prevent the accident Dr. Smith spoke of with the long handled gouge. That is the rule that should be observed by any one who uses a long handled instrument. You cannot bore a hole through a swing door and not do harm to the opposite side unless there is a complete counter-balance there to the pressure you are applying. It is so with holding the chisel of Dr. Bryant's in the left hand in this manner and working with the right hand.

DR. ANDREWS (closing): I can hardly refrain from making some remarks upon the papers read in connection with my paper, which I suppose I have a right to do, even though I am closing the discussion of my own paper.

With regard to the ossicles and hearing, mentioned in some of the papers, it may be said that if the ossicular chain is broken, and the ossicles are doing no good, the hearing will be better if they are removed. That, I think is true whether they are necrotic or not.

In regard to the use of the front bent gouge, I would say that safety lies not in any instrument. Safety lies in the mind and hand of the operator; and there is no best instrument, in my judgment, for this operation. The instrument is best for each man which he can use best. Dr. Bryant may be able to use this to better advantage than any other instrument. I doubt if I can. I shall try it and see how I succeed.

With regard to the hearing after radical mastoid operations my observations are: 1. When bone conduction is impaired, the hearing will not be likely to be improved by operation. 2. When the hearing is better than the whisper for three feet it will not be improved by operation If the hearing is less than the whisper for three feet and bone conduction good, we have reason to believe that the hearing will be improved.

In the methods of examination which I have suggested, as in all other means of diagnosis, there is no plan that will work itself. What a man learns from these tests depends upon himself more than upon the methods he uses; depends upon the accuracy of the conclusions which he is able to arrive at from their use. A method of examination should not be condemned because a man has gone wrong in following it. It is not the fault of the method; it is the fault of the application.

DR. STUCKY (closing): I am very grateful for the free reference that has been made to my paper. I believe if I could reread some parts of it my standpoint would be made clearer than it seems to be to some of the gentlemen here. I suppose there are few of us that have the record that Dr. Hotz has. You can hardly expect that a man in the small town who deals with ninety-nine per cent of his cases which are seen first by the general practitioner in sections remote from his own home, and often in the mountainous counties, will get as brilliant and as rapid results as those of you who live in the large medical centers.

Dr. Stein's reference to the need of education in Kentucky I freely admit, and there needs to be missionary work done along those lines in some other states, too. I want somebody to tell me about my mistakes. I don't need any flowers about my successes. I feel pretty sure on that score.

I agree with Dr. Timberman that, especially in these cases that are septic and broken down and two-thirds dead when they come from an operation, after the operation the hard work begins. Is there any reason, why the average case of a classical mastoid, should require from three to six weeks, or longer in healing up? And why the average radical mastoid should take from six to twelve weeks in healing up? Now I think I have had pretty good results. I may not have always done a clean operation, but it looks clean and feels clean when I am through with it. But when the leucocytes are away up yonder, from twelve to twenty thousand, and the patient is decidedly septic with not much resistance power left, I congratulate you if there are no unpleasant results following the operation.

DR. BRYANT (closing): I think that we should cordially welcome anything helpful to our diagnosis and any way of demonstrating the need of operation to the general practitioner. Not long ago, in consultation, I saw a case of a suppurative ear. There were no signs of extension, but a very high temperature. The operation disclosed a large necrotic area of the dura and brain tissue.

This local condition and the cause of the systemic infection had been overlooked for a long time.

Dr. Hotz recommends that operation be postponed until the indications are imperative. The point of view depends a good deal on what one is looking for, whether for operations or for cure without operations. Most of the cases complicated with caries even can be cured in time if the necrotic area is small. Sometimes it is difficult to decide whether it is best for the patient to have a radical operation performed and be done with it, or to undergo prolonged and expensive treatment. Often it is cheaper to have the operation performed.

Dr. Stucky's remarks apply I think in some degree, to after-treatment. Three-quarters of the mastoid operation depends upon the after-treatment. Even if the operation is a little uncertain, the results are more or less satisfactory, provided the after-treatment is carefully looked after by an experienced surgeon, and not by unskilled assistants.

Dr. Hotz (closing): I am pleased to see that the chief object of my paper was fully appreciated by the audience; that is to say, that if we give our personal attention to our cases we can accomplish better results, than if we let the treatment be carried out in the ordinary way by the patients at home; just as you get better results in the after-treatments of the operations if you attend to the dressings yourself, and do not leave them to the internes.

That necrosis in the tympanic cavity or attic requires more than medical treatment, no one will deny. Nowhere in my paper have I claimed that I will save a patient from an operation if there is necrosis. But the presence of granulations in the ear, in the attic, or the presence of an inoffensive discharge from the ear, does not indicate necrosis. I make that statement, the statement of one of the gentlemen who discussed the paper to the contrary notwithstanding. And to prove the presence or absence of necrosis, the probe that I showed to you will be an invaluable instrument. You do not have to guess. You can touch it. I simply wanted to show that you do not need to be so rash as to do an extensive operation because there is a chronic condition in the attic which can be cured. The gentleman who opened the discussion said: What means a cure? The ear may be dry for a number of months or a year or two years, he said, and still necrosis exist. I beg to differ with him. A patient often says an ear is dry and the doctor may look in and find it dry. That is just where the

importance comes in of investigating the ear a little better than merely by ocular inspection. The ear may be dry because there is not enough secretion to run out or run down into the tympanic cavity. But if you take one of those little applicators of cotton and swab it around in the attic; you will find the cotton moist, or you will bring down some crusts of dried up secretions. Then I do not call a case cured. But if I bring the cotton out after thoroughly wiping in every direction, and it comes down absolutely clean and dry, I am sure I am entitled to think the lining of the attic is in a satisfactory condition. If after two years that patient should come back with a discharge from the attic, or from the middle ear, he simply has contracted another inflammation. But I would not for that reason, consider that an operation in the past had been indicated.

The Submucous Resection of the Septum. By WILLIAM LINCOLN BALLENGER, M.D., Chicago, Ill. *(Published in full in this issue of* THE LARYNGOSCOPE, *page 265.)*

Hemorrhage in Nose and Throat Operations. By EMIL MAYER, M.D., New York. *(Published in full in* THE LARYNGOSCOPE, *page 699, Volume XV.)*

Tumors of the Middle Ear, with Report of Two Rare Varieties. By JOSEPH BECK, M.D., Chicago, Ill. *(Published in full in* THE LARYNGOSCOPE, *page 765, Volume XV.)*

DISCUSSION OF PAPERS OF DRS. MAYER AND BECK.

DR. GOLDSTEIN: The paper of Dr. Mayer developed so many points of practical value that the short time allotted for the further discussion of our work this evening, is not sufficient to do it justice. I really believe that if we could take up and carry out every practical suggestion in all the work that we do in the nasal and naso-pharyngeal operative field that Dr. Mayer brings out in his paper, we should be decidedly at an advantage so far as the after-treatment of our patients is concerned. The two points that appeal to me as of most importance are, in the first place, the requirement that the patient rest after an operation, even of minor consideration. It strikes me that is a valuable point and a matter that I hope to carry out perhaps a little more regularly than I have in the past. The other is the question which has been raised on the floor of the Academy on various occasions, where there is considerable difference of opinion among the operators, and that is, whether or not

to pack after an intra-nasal operation. Personally I am entirely in accord with the suggestions of Dr. Mayer. I believe in the pack after nasal operation. I believe that the essential points of value for this pack are the control of the hemorrhage or subsequent secondary hemorrhage, and in any of those selected cases in which we may still require the use of the galvano-cautery (and some of us still use that instrument on selected cases), the prevention of synechia in the healing of the wound; and thirdly the value of having your mucosa in close apposition after septum operation. I understand even that some operators are in the habit in the newly developed sub-mucous septum operation, of leaving one side, the side opposite to the operative field, without a pack. I believe the justification of a pack is made in the pressure, the equalization of the pressure on either side of the septal area. So all in all, the practical points of the paper bear considerable observation, and I am sure many of us regard them as of importance. Dr. Beck's paper is certainly a valuable adjunct; a valuable addition to our literature on the subject, and presents a very complete clinical report.

DR. STEIN: The report of Dr. Beck's case brings out several very interesting features, particularly as to the teachings of authorities on observed malignant growths of various kinds, which is to the effect that primary involvement of the middle ear is rare. The case reported by Dr. Beck is unusually rare. When we have an involvement of the middle ear by such growths, they are usually secondary; that is they are growths that invade the middle ear cavity from the base of the skull, or the region surrounding the ear, from the parotid, or nasopharynx, or the antrum, or more frequently the auricle and the auditory canal. This case apparently had its origin in the middle ear, I should judge, or probably just external to that, in the end of the canal. Another feature of this case which is of particular interest clinically, is the great variance from the teaching usually given to us, relative to such growths. We ordinarily look, in such cases, for the history of considerable pain and repeated hemorrhages, discharge, extreme sensitiveness of the ear, or of the mass; but none of these symptoms seemed to be present in this case, at least not in the early history of the case. Therefore it is only natural that one should make a diagnosis of aural polypus, as Dr. Beck did, and not expect any malignant condition until later. If it had its origin in the middle ear and was not associated with any form of middle ear disease, it makes it all the more rare and unique because the authorities show that most all

these growths are associated with some chronic suppurative middle ear disease.

DR. BALDWIN: Just two points that have not been mentioned. They seem very homely, but as they have served me so well, I think they may serve others. My attention was called to the administration of the tincture of chloride of iron before operations. It really seems to lessen the hemorrhage. It is well to continue its administration for a few days after the operation. Where one must pack for post-operative hemorrhage, I would mention the use of a strip of smoked fat ham or bacon. This was used years and years ago, but has fallen into disuse. I think it saved the life of one of my patients. You can cut it from the inside of a piece of meat and if you wish, soak it in some antiseptic solution. In some cases where good resulted from its use, it was thought necessary to remove it in from twelve to twenty-four hours, and the bleeding recurred. You may have bleeding so profuse that you must hold the packing in with one pair of forceps while you pack with another. Leave it in forty-eight hours or longer. It will become practically digested at the end of that time and you have nothing but a little skinny substance left, the oil having been cared for by the tissues. I am quite sure that in some desperate case you may find it worth remembering. Everything else had been tried in my case, and the man would have died if it had not been used.

DR. BALLENGER: I wish to narrate an incident that once occurred to me with the Peter's snare, which at that time probably was one of the best heavy snares on the market, and one which I used in many cases, up to the last four or five years, since which time I have not used a snare in my operations. I removed a pair of tonsils from an adult, and about two hours after the operation the patient began to bleed. In the meantime, I had left my office, going to the hospitals and finally to my home, and it was as much as eight or nine hours before they could get me by telephone. The patient had been bleeding most of this time. It took me another hour to reach the patient's bedside, and when I had arived, I found he had stopped bleeding. He had been bleeding all told eight or nine hours. They had in the meantime called in a local physician, and he had done the best he could with the patient, but without success, apparently. The patient was so much exsanguinated, that it was two weeks before he could leave his bed. That is the worst experience I have had with the snare, which previously I had looked upon as the means of bloodless removal of the tonsils. Since that time, I have

been a little afraid of bloodless methods; that is, I have doubted rather, the existence of the bloodless method of removing tonsils.

As to the other points in the paper, I am in the main, in general accord with Dr. Mayer's conclusions. I do not, however, like as well as he does, the idea of packing the nose after nasal operations. If I do not expect a hemorrhage, or if I have no mechanical reasons for packing, as we do have in the sub-mucous operations where we must have apposition of the mucous membranes in order to prevent haematoma, I like to avoid a dressing unless I have a special reason for using it. In other words, the nasal cavity is an infected area in spite of all we may do, and I believe the open method is better than the method which leaves it subject to the retained secretions that must follow the introduction of a nasal dressing. When I wish to leave a nasal dressing in place for twenty-four, forty-eight or seventy-two hours, I employ either the sub-nitrate of bismuth gauze, or I saturate the gauze with a solution of the compound tincture of benzoin, squeezing out the excess of fluid, and packing the nose with this preparation. By so doing we find that when the gauze is removed at the end of seventy-eight hours there is no odor, and the wound is comparatively clean. I think that is one of the safest means of dressing a nose that I know of as far as infection is concerned. I have left the gauze in place in the antrum for eight or nine days and removed it at the end of that time and found it perfectly sweet.

DR. BLAAUM: It has been shown that bleeding after tonsillotomy is very often the consequence of a removal of a part of the posterior fold. Therefore it would be wise to make an examination after the removal. I believe there is no doubt that very many of the post-operative hemorrhages are due to a lesion of the posterior fold.

DR. ROBERTSON: Dr. Mayer said he had secondary hemorrhage, but I think the term has been misused. Secondary hemorrhage does not come a few hours after an operation. This is late primary hemorrhage. Secondary hemorrhage is after a slough.

As a dressing for the nose if packing is to be avoided, a great many are now using collodion. To dry the tissue you use the adrenalin. Dry thoroughly and paint with three or four coats of collodion. I always pack nasal cases, and I pack them with sterile gauze saturated with sterile or medicated vaseline. I have seen and used all the gauzes that have been advocated and I have never seen anything that suits me as well as that. It slips out easily, does not

stick to the tissue, and the only thing about it that is disadvantageous, is that the secretions of the nose decompose more readily than they do with some of the other packing. You cannot leave it in more than thirty-six hours.

In regard to tonsil hemorrhage, that comes in my opinion, not from any particular operation; it comes from an incomplete removal of the tonsil. It comes from the fact that you cut away part of the tonsil, and leave, as Dr. Mayer suggested in his paper, a tonsil that is involved in cicatricial tissue. As soon as you cut the tonsil out so completely that you get into the soft connective tissue, then your hemorrhage stops.

Dr. Spohn: The paper of Dr. Mayer was especially practical. Dr. Beck's is practical also, but we do not come in contact with that subject quite so often. It seems to me that these cases of hemorrhages occur because the tonsillotomies are not thorough, but I cannot understand how one can do a great number of operations day in and day out and not have any hemorrhages. I make it a rule always to paint over the surface of the faucial region, if that be the region involved, with a sixty or eighty grain solution of nitrate of silver, and that seeping is nearly always stopped in those cases. There is another little point. If a man does his operation in the country and has not his instruments and pharaphernalia, he is often in a position where he cannot very well stop the hemorrhage. I was caught in such a position at one time and I resorted to the old, old method of vinegar inhalations, and I thought it was probably due to the styptic action of the vinegar, but after working with a number of other cases, I find it is due to the mechanical action of the breathing, by taking long, deep respirations. We get an action of the muscles which closes the blood vessels.

Dr. Bernstein: Just a little point I wish to make, which was given to me by an old practitioner, that is after tonsil operation to rub the surface with turpentine. It is an old-fashioned remedy, but it acts wonderfully well. It reduces after-swelling, and in a measure controls hemorrhage. The subject of calcium-chloride used internally has been mentioned. I have had cases of internal hemorrhage and have used this calcium-chloride with satisfactory results.

Dr. Mayer (closing): I will take but a moment, and say but a word. If in the experience of your associates, for whose opinion you have respect, there is a possible element of danger of your patient having a secondary hemorrhage, and if no harm can come from packing, why not pack?

Eustachian Salpingitis. By FRANK H. KOYLE, M.D., Hornellsville, N. Y. *(Published in full in* THE LARYNGOSCOPE, *page 773, Volume XV.)*

How Much Attention Should We Give the Middle Turbinate Body in Diseases of the Accessory Sinuses? By CHARLES M. ROBERTSON, M.D., Chicago, Ill. *(Published in full in* THE LARYNGOSCOPE, *page 892, Volume XV.)*

The Oto-Projectoscope. By M. A. GOLDSTEIN, M.D., St. Louis, Mo. *(Published in full in* THE LARYNGOSCOPE, *page 105, Volume XVI.)*

The Diseased Faucial Tonsil and its Operative Treatment. By WM. R. MURRAY, M.D., Minneapolis, Minn. *(Published in full in* THE LARYNGOSCOPE, *page 851, Volume XV.)*

The Clinical Significance of Otalgia. By PERCY FRIDENBERG, M.D., New York, N. Y. *(Published in full in* THE LARYNGOSCORE, *page 862, Volume XV.)*

DISCUSSION.

DR IRA J. DUNN: That the larynx may often cause pain in the ear is emphasized frequently by the cough produced on cleansing the ear. Any and all diseases of the trigeminal may refer pain to the ear. This was further illustrated in a very recent case of antrum disease in which the aural pain caused most suffering. For several days even when the turbinates occluded the whole nasal passage with great pressure, and pain over the frontal sinus would have been most expected, the pain in the ear was most severe. Whatever affects this nerve occasions severe otalgia. Gout and rheumatism which disturb so many nerve tracts without doubt produce much otalgia. There was grave criticism at yesterday's meeting of the use of salycilates and othr rheumatic medication in the relief of headache, considered due to gout or rheumatism, and we were told that proper glasses will cure every case—old medication being folly. So long as there is no mechanical device similar to glasses to increase and correct the hearing, we can likely continue medicinal treatment of these cases without fear of so severe criticism.

EXHIBITION OF PATIENTS.

A Mastoid Case.

DR. BRYANT showed a patient on whom he performed a radical mastoid operation for extensive caries of the tympanic cavity a year previously. The operation had to be modified on account of

the anterior position of the sigmoid sinus which approached to within .5mm. of the external auditory canal. This necessitated the opening of the antrum and the epi-tympanic space through the meatus. The blue color of the sinus can be seen on the posterior wall of the meatus.

The operator attributes the preservation of this extremely anteriorly placed sinus to the use of his front-bent gouge. On account of the small amount of bone which had been removed, he was tempted to try a new procedure with the dressing. The wound was closed posteriorly and a small amount of gauze was placed in the canal, sufficient only to distend it to its normal size.

On the 4th day the packing was removed from the meatus and not replaced. On the 6th day the posterior wound was healed and the tympanc cavity nearly dry. On the 13th day the wound behind the ear had finished desquamating. On the 22nd day there was no more moisture in the ear. On the 23rd day the enlarged tympanic cavity was epidermatized except at the mouth of the Eustachian tube. On the 42nd day the whole tympanic cavity was epidermatized.

This is the first case of radical operation which has been treated according to this method. Encouraged by the short convalescence, he has tried it in eleven cases, in all of which it has worked most satisfactorily.

DEMONSTRATION OF INSTRUMENTS.

Nasal Speculum for Submucous Operation. Septal Bone Forceps.

By JOHN MCE. FOSTER, M.D., Denver, Col.*

The instruments which I herewith present to you will have acquired special interest on account of their use in the operation which has been so excellently presented to you by Dr. Ballenger, the "Sub-mucous Resection of the Nasal Septum."

I found that when I first commenced doing this work in January last, that the instruments at my command were quite inadequate for the work requiring a great deal of time for the operation and much patience and heroism on the part of the patient to submit to the trying ordeal; and at the completion of the operation both of us were worn out, nervously and physically. With the idea of accomplishing the same results in a very much shorter space of time and with less danger of lacerating the delicate mucous membranes and perichondrium which had been detached from the septum, I devised this speculum which is much lighter than the

* For illustrations see pages 288 and 290.

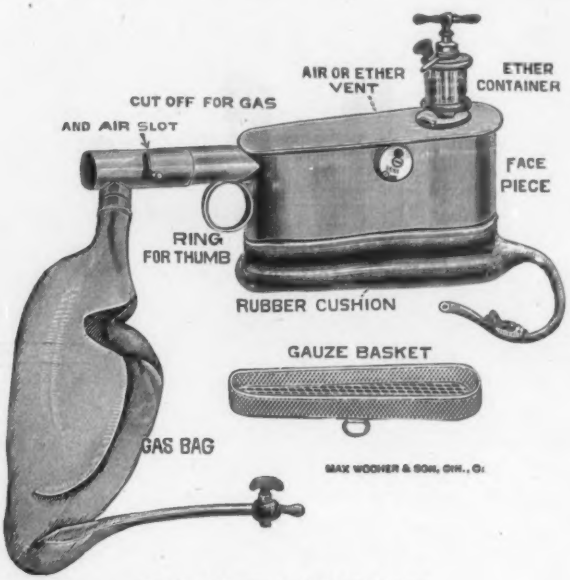
Killian model and I think that the slight amount of spring holding the 2 plates apart, will be found just enough to hold the perichondrium on each side well away from the septal cartilage. In this way the field of operation is well exposed, the bleeding can be controlled with swabs on tooth-picks, and the danger of laceratng the perichondrium is greatly lessened by these 2 metal plates protecting it from the instruments when introduced and withdrawn.

Dr. Ballenger's swivel knife leaves nothing better to hope for in removing the septal cartilage, but I had never seen any instrument that adequately removed the ethmoid and vomer. The best instruments at hand were some punches that removed only comparatively small bits at a time, necessitating a great many introductions and withdrawals of the instrument, consuming much time and increasing the danger of tearing the mucous membrane flaps. To overcome this difficulty and enable one to remove all the bone that is necessary in three or at the outside four bites, I have devised the bone forceps which I herewith present. This instrument not only removes quite a large segment of the bony septum at one bite, but also retains the resected piece within the jaw of the forceps so that when the instrument is withdrawn, the piece of bone is withdrawn also, thereby avoiding the delay of searching in the wound for displaced piece of detached bone. In some of these cases the hemorrhage is quite continuous and fairly profuse so that it is no small matter at times to find and remove a detached piece of bone that has fallen well back toward the posterior part of the cavity. This bone forceps, I am sure, will give perfect satisfaction to any one using it. It is made by Jones, Instrument Maker, Denver.

A New Inhaler for the Nitrous Oxid Ether Series. By SAMUEL IGLAUER, M.D., Cincinnati, Ohio.

The apparatus that I wish to present is one that I have devised for the nitrous oxide-ether series. In its simplified form it consists of a closed, accurately fitting metal face-piece, provided with an inflated rubber cushion. Within the face-piece is a wire basket for the gauze. Upon the top of the face-piece is a detachable glass and metal ether container from which the ether can be fed at will (modified after Brown). A short Y-piece of metal tubing telescopes at one end with the face-piece. To the other end of this tubing a larger rubber bag for the nitrous oxide is attached. A small lever projects through an air slot in the tube and controls

an obturator valve, which prevents the nitrous oxide from escaping before it is desired. This is the only valve in the apparatus, and acts simply as a cut-off. On the sides of the face-piece are two openings through which ether or air may be admitted if necessary. A large thumb-ring enables the anesthetist to hold the inhaler and to support the angle of the patient's jaw with one hand, leaving the other hand free.

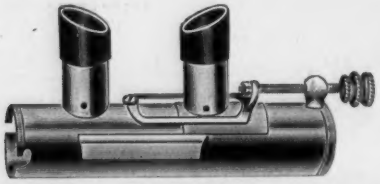


Combined Nitrous Oxid Ether Inhaler.

Transilluminator. Paraffin Syringe. By JOSEPH C. BECK, M.D., Chicago, Ill.

I wish to present a specimen I presented two years ago, and yesterday when Dr. Stein read a paper he said something about it. He used the formalin with heated air. I have used this method in suppurative ear disease and find it of some advantage in using formalin, and others have used it for this purpose. I have used this instrument, and others have also, for transillumination. It is used for transillumination of the antrum by placing this between the lips, and with electricity it gives perfect transillumination. I have studied the transillumination of the pharyngeal sinus and

can perfectly illuminate both sinuses at one time by having two tubes running at right angles from the lamp to receive a uniform light and place this over the sinuses, allowing the patient to press the head against the instrument, making two closed orifices and we receive a transillumination of the pharyngeal sinuses. It is of some advantage to do both at one time, as it is not necessary to carry the shadow in your mind. It gives sufficient intensity of light. There are two widths, which makes it fit different breadth of face.



Transilluminator.

I would also like to show an instrument I have used with some satisfaction in connection with a paraffin syringe. There are enough for this work already, but I have found this to be a little better than any I have tried, and I have used it for other purposes. I have used it for sub-periosteal injections in the ear for anaesthesia, and also for the purpose of sub-mucous resection and doing that operating comparatively bloodlessly and painlessly. This needle is for that purpose. You can inject the material drop by drop or all at one time as you please. I would recommend this for injecting eucaine and tongalin according to Neumann's formula. Most of the syringes leak at that point and you cannot get a good grasp, but with this addition you get a firm grasp in the handle.

(For Illustration see THE LARYNGOSCOPE, *page 35, Volume XVI.)*

Swivel Septum Knife. By WM. L. BALLENGER, M.D., Chicago, Ill. *(Described in* THE LARYNGOSCOPE, *page 417, Volume XV.)*